



Annex M North Tahoe Fire Protection District

M.1 Introduction

This Annex details the hazard mitigation planning elements specific to North Tahoe Fire Protection District (North Tahoe FPD), a previously participating jurisdiction to the 2016 Placer County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to North Tahoe FPD, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

M.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Placer County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table M-1. Additional details on plan participation and District representatives are included in Appendix A.

Table M-1 North Tahoe FPD – Planning Team

Name	Position/Title	How Participated
Steve Leighton	Acting Fire Chief	High level oversight, review and approval of NTFPD's LHMP update
Steve McNamara	Division Chief/Fire Marshal	Oversight for the update: Provided edits, updates and information related to past occurrences, vulnerability, capabilities, district information. Verified hazard id table, Guided updates to and development of new action items.
Sarah Lagano	Battalion Chief	Provide edits, updates and new information related to past occurrences, and mitigation actions related to GIS and IT.
Scott Sedgwick	Battalion Chief	Provide edits, updates and new information related to past occurrences, and mitigation actions related to Pandemic
Nikki Wagner	Captain	Provide edits, updates and new information related to past occurrences, and mitigation actions related to water infrastructure(hydrant) improvements
Brent Armstrong	Captain	Provided NFIRS incident data for use in this plan, and insights relating to wildland fire response.
William Marshman	Firefighter	Provide edits, updates and new information related to past occurrences, and mitigation actions related to communications, and radio systems

Name	Position/Title	How Participated
Eric Horntvedt	Forest Fuels Coordinator	Coordinate and lead NTFPD's LHMP update: Attend meetings, provide general edits and updates to past annex, hazard id table, mitigation actions, vulnerability and capability info, and map. Solicit additional information from NTFPD planning team members.
Erin Holland	Public Information Officer	Co-lead NTFPD's LHMP Update: Attend meetings, general edits and updates to past annex, mitigation actions, manipulate NFIRS data, solicit additional information from NTFPD planning team members

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2016 LHMP through other plans and programs shown in Table M-2.

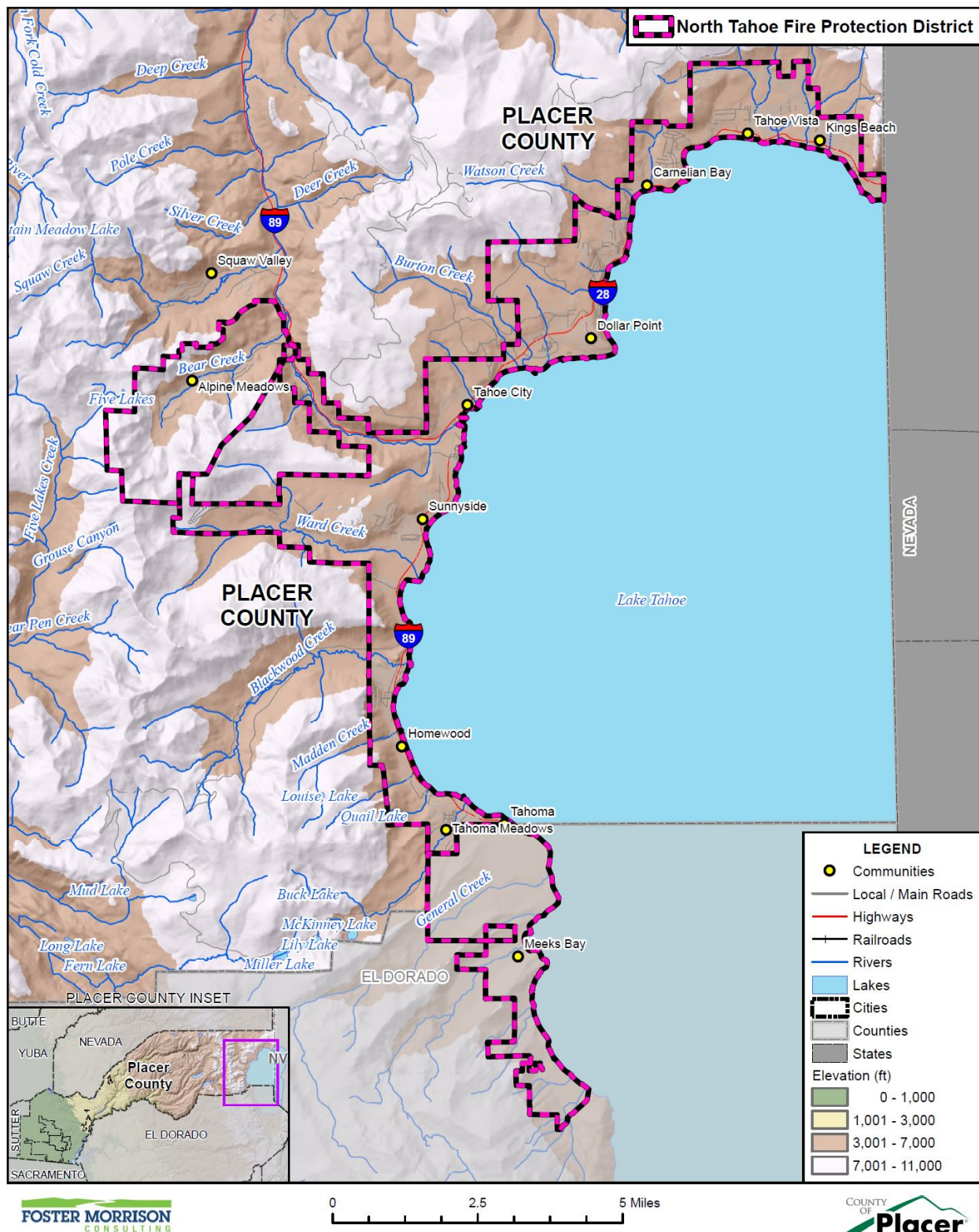
Table M-2 2016 LHMP Incorporation

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
2015 Lake Tahoe Basin CWPP	Section 5.3.5 of the 2015 CWPP recognizes the inclusion of Local Hazard Mitigation Plans that have identified wildfire as a hazard and provide for mitigation actions to reduce the risk of catastrophic fire
Placer Emergency Operations Plan (2017)	The EOP used the LHMP as a basis for hazards to plan for.
DRAFT Lake Tahoe Climate Adaptation Action Portfolio (CAAP)	LHMP is not specifically addressed in the "Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin" but it was recommended to be included (along with CWPP) in the developing Climate Adaptation Action Portfolio to show agency commitments to mitigating the risks associated with natural hazards.
Pre-Attack Plans	LHMP is informally incorporated as Pre-attack plans are in place to plan for response to hazards.

M.3 District Profile

The District profile for the North Tahoe FPD is detailed in the following sections. Figure M-1 displays a map and the location of the District within Placer County.

Figure M-1 North Tahoe FPD



Data Source: Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

M.3.1. Overview and Background

North Tahoe Fire Protection District (NTFPD) is an all-risk career fire district that protects various communities within two counties on the north and west shores of Lake Tahoe, North America's largest alpine lake. The district's service area covers over 40 square miles and over 20 miles of shoreline. The district is entirely within the unincorporated areas of Placer and El Dorado Counties. The district's mission is to provide the highest possible level of fire, rescue, and pre-hospital emergency medical services and ambulance transport, as well as prevention and education to the residents and visitors of the communities served.

NTFPD personnel are trained to respond to events such as structure and wildland fires, technical rescue operations, confined space operations, ice/swift water/back country rescues, and mitigation of hazardous materials incidents. NTFPD's service area consists of eight fire stations, five of which are staffed fulltime (24/7/365), and we are a career fire department with 51 uniformed Fire/EMS personnel and operate a daily minimum staffing of 12 firefighters. In addition to the District's formal service area, consisting of over 17,000 housing units and over 1,000 businesses spanning 27.5 square miles, the District provides service via long-term contract to the Alpine Meadows community, consisting of 750 housing units in Placer County, and the Meeks Bay community, consisting of 2,800 housing units spanning 14 square miles. The Meeks Bay community includes over 2,000 acres of state park and federal forest land. According to an audit-certified tax base valuation for 2020, District personnel protect an assessed valuation of \$9.3 billion dollars in our combined service area, \$8.1 billion of which is in Placer County.

The district's service area ranges from 6,000 feet – 9,000 feet in elevation, and at 80 miles from the county seat, is geographically isolated and vulnerable to natural disasters such as severe winter storms, avalanches, high mountain passes, flooding, landslides, and wildland fires, which leave the region dependent upon local agencies for emergency incident response on our two-lane roads that are frequently gridlocked with seasonal traffic.

Hotels, lodges, and vacation home rentals are located throughout our service area, resulting in our population increasing from 17,000 fulltime residents to over 75,000 people during peak seasons, nearly five times the resident population, which creates an additional 10-20% increase in calls for service daily. These numbers do not reflect the overall Lake Tahoe tourist population traveling through our community, whose safety is also impacted by these local hazards. An analysis performed by Stantec using cell phone data purchased from Air Sage for three months in 2014 — February, July, and August — arrived at a statistic of visitors entering the Tahoe Basin 24.4 million times. This number can range from 19.5–29 million visitors in any given year. The 2014 data also showed that winter and summer day use accounted for 42 to 43 percent of that figure, the balance of those entering staying at least one night.

The district is always available to supply personnel, equipment, and expertise to neighboring departments in California and Nevada. Through mutual and automatic aid agreements, the district assists other local, county, and federal agencies, indirectly covering more than 200 square miles and responding to an average of 200 out-of-district calls each year. As an example, in 2020 district staff responded to 14 major California wildfires that were declared federal disasters, including the North Complex/Zogg, the Red Salmon Complex, and the SCU Lightning Complex Fires.

M.4 Hazard Identification

North Tahoe FPD identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table M-3).

Table M-3 North Tahoe FPD —Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/Severity	Significance	Climate Change Influence
Agriculture Pests and Diseases	Limited	Highly Likely	Critical	Low	Medium
Avalanche	Limited	Highly Likely	Limited	Medium	Medium
Climate Change	Extensive	Likely	Limited	Medium	–
Dam Failure	Significant	Unlikely	Critical	Low	Medium
Drought & Water Shortage	Extensive	Likely	Critical	Medium	High
Earthquake	Extensive	Occasional	Critical	High	Low
Floods: 1%/0.2% annual chance	Limited	Occasional	Critical	Low	Medium
Floods: Localized Stormwater	Limited	Highly Likely	Limited	Medium	Medium
Landslides, Mudslides, and Debris Flows	Limited	Occasional	Limited	Low	Medium
Levee Failure	Limited	Unlikely	Limited	Low	Medium
Pandemic	Extensive	Likely	Catastrophic	Medium	Medium
Seiche	Significant	Unlikely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Low	High
Severe Weather: Freeze and Snow	Extensive	Highly Likely	Critical	High	Medium
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Critical	High	Medium
Severe Weather: High Winds and Tornadoes	Extensive	High Likely	Critical	High	Low
Tree Mortality	Extensive	Likely	Critical	High	High
Wildfire	Extensive	Highly Likely	Catastrophic	High	High
<p>Geographic Extent Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area</p> <p>Likelihood of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.</p> <p>Magnitude/Severity Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid</p> <p>Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact</p> <p>Climate Change Influence Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact</p>					

M.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District's hazards and assess the District's vulnerability separate from that of the Placer County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Placer County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

M.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section M.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table M-3) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Placer County Planning Area.

M.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the District's total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the District. This data is not hazard specific, but is representative of total assets at risk within the District.

Assets at Risk and Critical Facilities

This section considers the North Tahoe FPD's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.

This definition was refined by separating out three classes of critical facilities as further described in Section 4.3.1 of the Base Plan.

Table M-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. North Tahoe FPD's physical assets, valued at over \$93 million, consist of the buildings and infrastructure to support the District's operations.

Table M-4 North Tahoe FPD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
Headquarters Station 51	Essential	\$15.6 million	All
Station 52 Kings Beach	Essential	\$13.5 million	All
Station 53 Homewood	Essential	\$10.5 million	All
Station 54 Dollar Point District shop	Essential	\$8.5 million	All
Station 55 Carnelian Bay	Essential	\$8.5 million	All
Station 56 Alpine Meadows	Essential	\$8.5 million	All
Station 67 Meeks Bay	Essential	\$10.5 million	All
Station 68 Tahoma	Essential	\$8.5 million	All
Type 1 Structure Engines X 6	Essential	\$800,000 each	All
Type 3 Brush Engines X 3	Essential	\$500,000 each	All
ALS Ambulances X 6	Essential	\$150,000 each	All
Water Tenders x2	Essential	\$225,000	All
Rescue Vehicles x2 (UTV with Trailer)	Essential	\$50,000	All
Snowmobiles x2 (with trailer)	Essential	\$40,000	All
Loaders x2 (snow removal)	Essential	\$120,000	All
Snowblowers x 9	Essential	\$4,000	All
Generators x7	Essential	\$25,000	All
SCBA Air Trailer x1	Essential	\$35,000	All
Technical Rescue Trailer	Essential	\$8,000	All
Command Vehiclesx5	Essential	\$60,000	All
Utilities x17	Essential	\$40,000	All
Public Info/CERT Trailers x2	Essential	\$8,000	All
Sign Trailers x4	Essential		All
Trailer Chippers x2	Essential		All
Track Chipper x1 (Chipper and flatbed Trailer)	Essential		All
Chipper tow/dump truck x1	Essential		All
Placer Co. Sheriff Dispatch & Office	Essential	-	All
Highways, Bridges, Arterial Roads	Transport/ Lifeline	-	All
Utilities Power, Water, Gas, Sewer, Cell Towers	Transport/ Lifeline	-	All

Name of Asset	Facility Type	Replacement Value	Which Hazards Pose Risk
CalTrans & Placer Co. DPW Facilities and Equipment	Transport/ Lifeline	-	All
Lake Tahoe Outlet Dam	High Loss	-	All
Schools and Shelter locations	High Loss	-	All
Groceries stores		-	All
Total		\$93,380,000	

Source: North Tahoe FPD

It is important to note that there are no hospitals within the North Tahoe Fire District boundaries. This becomes a significant vulnerability when the highways become impassable due to flooding, rock/mudslides, avalanches, and interstate closures.

Populations Served

Also potentially at risk should the District be affected by natural hazard events are the populations served by the District. North Tahoe FPD provides services to a wide variety of populations with different vulnerabilities. Between the Census and the SHMP, we have statistics showing a high concentration of persons over the age of 65, making for as much as 30% of our population. Approximately 5% of our population is over the age of 75, and with no assisted living facilities, these communities are heavily reliant on neighbors and public safety providers, and as many as 20% of our community are living with a disability. In some communities, as high as 24% of our population are below the poverty level. We have some communities with as high as 30% Limited English Proficiency. As much as 12% of our population are without any type of computing device, and as high as 16% are without internet access. Approximately 5% of our population are without access to a vehicle. In the northern portion of our service area, the community is ranked moderate to high on the Social Vulnerability Index, meaning they are likely to experience the greatest risks and challenges in the event of a disaster.

While this area is home to only about 17,000 residents, during high season some 75,000 people, on any given day, may be enjoying the vast recreational and tourist opportunities. This spike in population creates a unique vulnerability to the area, especially in the event highways become impassable due to flooding, landslides, avalanches, wildfire or gridlocks due to high visitor volume and extreme weather conditions. Even during the off-season, the lack of multiple transportation routes, if closed or compromised, can leave the resident and visitor population cut off from necessary, and potentially life-saving services.

Natural Resources

North Tahoe FPD has a variety of natural resources of value to the District. These natural resources parallel that of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan. Additionally, several state or federally listed species may be found within the District boundary. These are identified, along with other species of concern found in the District, in Table M-5.

Table M-5 NTFPD – Summary of Special Status Species

Type	Number
Animals – Amphibians	3
Animals – Birds	13
Animals – Fish	5
Animals – Mammals	8
Animals – Invertebrates	1
Botanical Species	29

Source: Final Tahoe Program Timberland Environmental Impact Report Appendix E, December 2020

Historic and Cultural Resources

North Tahoe FPD has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan. Also see Section 3.7 - Archaeological, Historical, and Tribal Cultural Resources of the Tahoe Program Timberland EIR, available at <https://www.ntfire.net/tahoe-pteir>.

Growth and Development Trends

General growth in the District parallels that of the Placer County Planning Area as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Population growth within the North Tahoe FPD continues but is not uniform throughout. The areas within and closest to the developed communities are growing fastest and have higher housing densities. The more rural, mountainous areas are experiencing limited growth, in part due to land ownership, lack of services, and overall rugged terrain. Unique to this part of Placer County is not the growth of full-time residents, but the influx of visitors and tourists to the area, especially during the peak summer and winter seasons. While this area is home to only about 17,000 full time residents, during high season some 75,000 people, on any given day, may be enjoying the vast recreational and tourist opportunities. Real estate volume did by increase 63% in 2020 during the pandemic and stay-at-home orders, and the change in remote work options may result in more growth in the longer term, however school enrollments are not increasing at the same level.

The District does not have a capital replacement plan, and 6 of 7 NTFPD Fire Stations are greater than 40 years old, and do not meet current seismic or building standards. Due to age of facilities and growth of community and organization, these are not meeting current needs.

Development since 2016

No District facilities have been constructed since 2016. As such, a change in vulnerability is unlikely. NTFPD Station 53 in Homewood did receive a complete interior remodel in 2020 to the expense of \$153,000 and there are ongoing capital expenditures for station.

Future Development

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Placer County Planning Area. Most District facilities are old and in need of remodels or complete replacement. The District's shop is insufficient in size and height to work on some of the larger apparatus, and the Prevention and Forest Fuels Division is expected to increase in size and exceed office space at the current headquarter station. More general information on growth and development in Placer County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Placer County Vulnerability and Assets at Risk of the Base Plan.

M.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table M-3 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Placer County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the District to each identified priority hazard, in addition to the estimate of likelihood of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

Depending on the hazard and availability of data for analysis, this hazard specific vulnerability assessment also includes information on values at risk, critical facilities and infrastructure, populations at risk, and future development.

Avalanche

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Hazard Profile and Problem Description

According to the Sierra Avalanche Center, avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Avalanches are a rapid down-slope movement of snow, ice and debris triggered by ground shaking, sound, or human or animal movement. Avalanches consist of a starting zone where the ice or snow breaks loose, a track which is the grade or channel the debris slides down and a run-out zone where the snow is deposited.

Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. The vast majority of avalanches occur during and shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Roads and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches.

Location and Extent

The two primary factors impacting avalanche activity are weather and terrain. Large, frequent storms deposit snow on steep slopes to create avalanche hazards. Additional factors that contribute to slope stability are the amount of snow, rate of accumulation, moisture content, wind speed and direction and type of snow crystals. Topography also plays a vital role in avalanche dynamics. Slope angles between 30 to 45 degrees are optimal for avalanches. The risk of avalanches decreases on slope angles below 30 degrees. At 50 or more degrees they tend to produce sluff or loose snow avalanches that account for only a small percentage of avalanche deaths and property damage annually.

Areas prone to avalanche hazards include hard to access areas deep in the backcountry and those in the more developed higher elevations of the County in the Tahoe basin. Avalanche hazards exist in eastern Placer County where combinations of the above criteria occur. The District is concerned about the Highway 89 corridor, Alpine Meadows, Ward Canyon, and Emerald Bay.

Past Occurrences

There have been no state or federal disasters in the County related to avalanche. The District noted the following avalanche past occurrences:

- In **1982** a large avalanche occurred in Alpine Meadows and a large avalanche in the 1200-1300 area of Sandy Way with major structural damage to several homes.
- In **1995**, an avalanche hit 2 homes in the 1300 area of Sandy Way, with no injuries and minimal damage to the two homes. We have had some mud slides in 1300 area of Sandy, as well as the 1700 block of Sandy over the years, blocking the road, no injuries or structural damage.
- Since 2015/2016, the District has not experienced any avalanches in Olympic Valley. The District did note an avalanche (thought to be in 2017) on Highway 89 south of Alpine Meadows road (North Tahoe District) that caught a few occupied cars.
- **March 2, 2018** – After heavy snowfall, an avalanche hit the Squaw Valley ski resort on Friday striking five people and sending two people to the hospital with injuries. Five guests were caught in the avalanche, two females and three males. One person had a serious lower body injury and was taken by firefighters to North Tahoe Forest Hospital. Another person was rescued and taken to a Truckee hospital and released a short time later. The other three were unharmed. A skier at the resort said at least three

of those people had to be dug out and that the slide started at the top of the Olympic Lady lift down to a run called Easy Street.

- **January 17, 2020** – A 34-year-old man was killed while skiing Friday morning and another was seriously injured when an avalanche unfurled a wave of snow on a run in the Alpine Meadows ski resort near Lake Tahoe.

Vulnerability to and Impacts from Avalanche

Avalanches occur when the weight of new snow increases stress faster than strength of the snowpack develops, causing the slope to fail. Avalanche conditions develop more quickly on steeper slopes (located in the eastern portions of the County) and where wind-blown snow is common. Avalanche impacts vary, but include risk to property, injury, or death. Avalanches generally affect a few snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Avalanches cause road closures, and can damage structures and forests.

Assets at Risk

The NFPD Station 56 is located in Alpine Meadows as well as roads and ASCWD utilities.

Climate Change

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the District, Placer County, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known, but is feared to be tens to hundreds of years.

Past Occurrences

Climate change has never been directly linked to any declared disasters. While the District noted that climate change is of concern, no specific impacts of climate change could be recalled. The District and

HMPC members did, however, note that in Placer County, the strength of storms does seem to be increasing and the temperatures seem to be getting hotter. Hotter temperatures, combined with recent drought conditions, exacerbates the potential for damaging wildfires.

Vulnerability to and Impacts from Climate Change

The California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change. California's APG: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Placer County falls within the North Sierra Region characterized as a sparsely settled mountainous region where the region's economy is primarily tourism-based. The region is rich in natural resources, biodiversity, and is the source for the majority of water used by the state. This information can be used to guide climate adaptation planning in the District and Placer County Planning Area.

The California APG: Understanding Regional Characteristics identified the following impacts specific to the North Sierra region in which the Placer County Planning Area is part of:

- Temperature increases
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increased wildfire

In addition to the above, the District noted it is anticipated that Tahoe could become a refuge for those looking to escape hotter conditions in the valleys

Assets at Risk

The District noted that its facilities will most likely not be at risk from climate change.

Drought & Water Shortage

Likelihood of Future Occurrence—Likely

Vulnerability—High

Hazard Profile and Problem Description

Drought is a complex issue involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate

water is the most critical issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the County, as well as the whole of the District, is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which does not usually affect water shortages and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.3.10 of the Base Plan.

Past Occurrences

There has been one state and one federal disaster declaration due to drought since 1950. This can be seen in Table M-6.

Table M-6 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	1	2014	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.10 of the Base Plan.

The District is experienced a multi-year drought 2014-15 that was part of a much larger drought throughout the western United States. During the most recent drought, the most widespread impact to the District was reduced tree vigor, which lead to an increase in bark beetle populations, white pine blister rust proliferation and widespread tree mortality across primarily White fir, Sugar pine, and Jeffrey pine trees.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the District, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended.

Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

The most significant qualitative impacts associated with drought in the Placer County Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. With a reduction in water, water supply issues based on water rights becomes more evident. Climate change may create additional impacts to drought and water shortage in the County and the District.

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section below, as well as in Section 4.3.2 of the Base Plan.

Drought prolongs the wildfire season, which increases overtime costs and wear and tear on District equipment, and exacerbates wildland fire risk, frequency and severity by contributing to rapid consumption of tinder dry fuels, leading to increased rate of spread and fire intensity which can exceed initial attack response capabilities and have negative impact to life, property, and the environment.

The HMPC noted that the 2014-2015 drought had impacts in the District. Crop damages were widespread, wildfire risk was increased, and businesses had felt impacts from the drought conditions.

Potential effects of the 2014 multi-year drought included:

- Reduced water for domestic consumption and fire suppression.
- Stress on natural vegetation leading to increased disease and mortality.
- Drought stressed/dead vegetation contributes to increased fire danger and fire behavior, leading to larger more catastrophic wildfire incidents.

Assets at Risk

Water utilities would be the primary asset at risk since NTFPD relies on primarily municipal water supply during fire suppression operations. NTFPD is situated within the WUI intermix and WUI defense zone, so forest health and vigor would be another asset at risk where drought stressed vegetation and the lack of moisture contributes to increased fire danger and behavior and could lead to catastrophic wildfire conditions.

Earthquake

Likelihood of Future Occurrence—Occasional

Vulnerability—High

Hazard Profile and Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.11 of the Base Plan. Placer County itself is traversed by a series of northwest-trending faults, called the Foothill Fault Zone, that are related to the Sierra Nevada uplift. This was the source of Oroville's 1975 earthquake (and an earlier event in the 1940s). Subsequent research of these events led to the identification and naming of the zone and questions about the siting and design of the proposed Auburn Dam. Earthquakes on nearby fault segments in the zone could be the source of ground shaking in the Placer County Planning Area.

Although portions of western and eastern Placer County are located in a seismically active region, no known faults actually go through any of the cities or towns. However, the Bear Mountain and the Melones faults are situated approximately three to four miles west and east of the City of Auburn respectively. Earthquakes on these two faults would have the greatest potential for damaging buildings in Auburn, especially the unreinforced masonry structures in the older part of the city and homes built before 1960 without adequate anchorage of framing and foundations. Similar lower magnitude but nearby earthquakes are capable of producing comparable damages in other Placer County communities.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. The District is located in an area where earthquakes of significant magnitude can occur, so both magnitude and intensity of earthquakes are expected to be moderate. Seismic shaking maps for the area show Placer County and the District fall within a moderate shake risk.

Past Occurrences

There have been no past federal or state disaster declarations from this hazard. The District noted no past occurrences of earthquakes or that affected the District in any meaningful way.

Vulnerability to and Impacts from Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Placer County lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured buildings can be very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. According to the CGS, North Tahoe Fire's service area is at the highest risk from earthquake in all of Placer County, and is at the highest point on the index for Earthquake Ground Shaking Potential. All District Stations are vulnerable to earthquake. If damage were caused by an earthquake, it would impact the District's ability to respond and serve the community during the disaster. NTFPD has only one of seven fire stations that was built to seismic standards.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The North Tahoe FPD is within the less hazardous Zone 3.

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life. No specific studies have been conducted in the local area in regard to the impacts of a large scale earthquake. In general, such an event would result in large scale widespread impacts on a regional level that could include:

- Structural collapse
- Transportation impacts
- Power and communications interruptions
- Structural and wildfire incidents
- Avalanches, mudslides, rock falls and landslides
- Dam failures and flooding
- Seiche Wave Events
- Loss of life and injuries on a large scale

- Economic impacts and business loss

Assets at Risk

All District Stations from Table M-4 are at risk from this hazard, as well as other critical infrastructure facilities.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence—Highly Likely

Vulnerability—Medium

Hazard Profile and Problem Description

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The North Tahoe FPD is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the District tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

5 of 8 NTFPD facilities are at risk to flooding and stormwater flooding:

- Station 52 (Griff Creek Floodplain and FEMA Flood Hazard Area)
- Station 53 (immediately adjacent to FEMA Flood Hazard Area)
- Station 55 (Adjacent to Carnelian Creek Floodplain)
- Station 56 (directly adjacent to Bear Creek & Truckee River Floodplain)
- Station 67 (Meeks Creek Floodplain)

Other areas of concern:

- HWY 89/Truckee River corridor
- Alpine Meadows and Bear Creek
- Griff Creek
- Watson Creek
- Dollar Creek
- Burton Creek
- Snow Creek Pond (Moon Dunes)
- Ward Creek
- Blackwood Creek

- Madden Creek
- McKinney Creek
- General Creek
- Meeks Creek
- Eagle Creek/Eagle Falls

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted the following past occurrences of localized flooding:

- In **1997** the District experienced areas of flooding and landslides related to El Nino resulting in hazardous conditions and road closures. Impacts were to the Highway 89 corridor between Tahoe City and Truckee and the Ward Canyon area on the west shore of Lake Tahoe. Future such events could impact many areas of the district and surrounding areas.
- **2016/17 Winter** - The 2016/2017 was a heavy winter, beginning with atmospheric river snow events as early as October, followed by wind events and flash flooding, seemingly nonstop through spring. The statistics are not available for 2016, however the first two months of 2017 saw North Tahoe Fire responding to 135 downed powerlines as a result of the storm/wind/flood cycle, and after just one of these storms, crews responded to at least three buildings, weakened or collapsed. In addition to flooding roadways, powerlines downed due to flood and winds may also be downed in a manner that blocks the roadways. Placer County had a state and federal declaration due to flooding in 2017.
- **2017/2018 Winter** - January 2018 saw similar storm activity causing downed powerlines.
- **2018/19 Winter** - December 2018 saw similar storm activity causing downed powerlines.

Vulnerability to and Impacts from Localized Flooding

Historically, much of the growth in the District and County has occurred adjacent to streams, resulting in significant damages to property, and losses from disruption of community activities when the streams overflow. Additional development in the watersheds of these streams affects both the frequency and duration of damaging floods through an increase in stormwater runoff.

Primary concerns associated with stormwater flooding include life safety issues, and impacts to property and to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Assets at Risk

District Stations are at risk to Localized flooding.

Pandemic

Likelihood of Future Occurrence–Likely

Vulnerability–Medium

Hazard Profile and Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity.

A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control (CDC) and Prevention has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning and preparation. An especially severe pandemic could lead to high levels of illness, death, social disruption, and economic loss.

Location and Extent

During a pandemic, the whole of the District, County, and surrounding region is at risk, as pandemic is a regional, national, and international event. The speed of onset of pandemic is usually short, while the duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu. There is no scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by number who die from complications from the pandemic.

Past Occurrences

There has been one state and federal disaster declaration due to pandemic, as shown in Table M-7.

Table M-7 Placer County – State and Federal Pandemic Disaster Declarations 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	1	2020	1	2020

Source: Cal OES, FEMA

The 20th century saw three outbreaks of pandemic flu.

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics.

- 2009 Swine Flu (H1N1)
- 2019/2020 COVID 19

Vulnerability to and Impacts from Pandemic

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding the current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent the spread of a pandemic by staying home, or “self-quarantining,” if they suspect they are infected. Pandemic does not affect the buildings, critical facilities, and infrastructure in the District. Pandemic can have varying levels of impact to the citizens of the District and greater County, depending on the nature of the pandemic.

Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths can occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-19, multiple businesses were forced to close temporarily (some permanently), and unemployment rose significantly. Supply chains for food and essentials can be interrupted.

The Covid 19 pandemic has affected North Tahoe Fire Protection District, but has not kept the District from providing 24 hour, 7 days a week emergency response to our community. Early in the pandemic we instituted Incident and Station Life Directives that were geared to lower exposure risk for all personnel. None of our staff contracted Covid 19 from an exposure while in the offices, stations or by transporting Covid 19 patients to the hospital. We closed our offices to the public, but we continued to meet the needs of our constituents and taxpayers remotely. Some of our administrative staff were able to work from home, our prevention staff was able to stagger shifts, work with proper PPE, and still carry-on essential Fire Prevention duties following all safety guidelines. All District stations remained fully staffed by firefighters and paramedics for emergency response. Going forward we will continue to assess our community's health and monitor our personnel to ensure every effort is being made to reduce our exposure to Covid 19.

Assets at Risk

Pandemics do not affect District facilities, but can affect District personnel who operate District facilities. During a pandemic the District would typically be considered essential which puts staff on the front line and at high-risk for exposure as they work to carry on the mission of the District and serve the community.

Seiche

Likelihood of Future Occurrence—Unlikely

Vulnerability—Medium

Hazard Profile and Problem Description

U.S. Army Corps of Engineers defines seiche as:

- A standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric.

- An oscillation of a fluid body in response to a disturbing force having the same frequency as the natural frequency of the fluid system. Tides are now considered to be seiches induced primarily by the periodic forces caused by the sun and moon.
- In the Great Lakes area, any sudden rise in the water of a harbor or a lake whether or not it is oscillatory (although inaccurate in a strict sense, this usage is well established in the Great Lakes area).

Seiches can be generated when the water is subject to changes in wind or atmospheric pressure gradients or, in the case of semi-enclosed basins, by the oscillation of adjacent connected water bodies having a periodicity close to that of the seiche or of one of its harmonics. Other, less frequent causes of seiches include heavy precipitation over a portion of the lake, flood discharge from rivers, seismic disturbances, submarine mudslides or slumps, and tides. The most dramatic seiches have been observed after earthquakes and large landslide events.

Location and Extent

Within Placer County, locations with the highest probability of impact are shore areas of Lake Tahoe from 0 to 30 feet above mean lake water level. This falls in areas served by the District. Speed of onset of seiche is short. The duration of the event tends to be short as well, continuing until the waves naturally dissipate.

Past Occurrences

There have been no state or federal disasters in the County related to seiche. No events of past seiche have affected the District.

Vulnerability to and Impacts from Seiche

Research from the University of Nevada estimates that an earthquake must be at least a magnitude 6.5 to cause a damaging seiche at Lake Tahoe. The two faults directly underneath the lake are considered capable of generating magnitude 7.1 earthquakes. Computer models of seiche activity at Lake Tahoe prepared by the University of Nevada research team estimate that waves as high as 30 feet could strike the shore. These projections suggest largest waves might hit Sugar Pine Point, Rubicon Point and the casinos in South Lake Tahoe. The seiche risk is potentially devastating as hundreds of houses are built along the lake and more than 17,000 people enjoy the Lake Tahoe shoreline every day in the summer.

In the District, a seiche could cause issues with low lying areas of the District.

Assets at Risk

District facilities, apparatus and personnel that are within low lying lakeside areas: Station 52, 53, 55, 67.

Severe Weather: Freeze and Snow

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile and Problem Description

According to the NWS and the WRCC, winter snowstorms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, trapping residents, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, propane lines and communication towers. Communications and power can be disrupted for days until the damage can be repaired, leaving residents at risk of freezing. Power outages can have a significant impact on communities, especially critical facilities such as public utilities. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds accompanying these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibility to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents with injuries and deaths can result. Freezing temperatures can cause significant damage to the agricultural industry.

Location and Extent

Freeze and snow are regional issues, meaning the entire District is at risk to cold weather and freeze events. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, the WRCC reports that in a typical year, minimum temperatures fall below 32°F on 209.0 days with 0.4 days falling below 0°F in eastern Placer County. Snowfall is measured in depths, and the WRCC reports that average snowfall on the eastern side of the County is 190.7 inches. Freeze and snow has a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Snow event can last for hours or days, and the snow stays all winter in the eastern portion of the County, often with significant snow depths.

Past Occurrences

There has been no federal and one state disaster declarations in the County for freeze and snow, as shown on Table M-8.

Table M-8 Placer County – State and Federal Disaster Declarations from Freeze and Snow 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Freeze	1	1972	0	–

Source: Cal OES, FEMA

The District noted that freeze and snow is a regional phenomenon; events that affected the eastern side of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.3.

Most notably, during the mid-80s, a gas main failure occurred in Carson City, Nevada, causing a major outage throughout the region. This also resulted in an overload of the power utilities in the District, causing failures lasting several days. The District estimates that such outages lasting several days during extreme weather events occur approximately every 2-3 winters.

According to the North Tahoe FPD planning team, major winter storms have routinely cut off transportation routes in the district for hours (as recent as March 2007) to over a week (back in the 1950s), stranding thousands and causing a major impact to services and supplies.

Freeze and snow events affect the District annually. Tahoe is known for major winter storms that cause adverse conditions, traffic delays, vehicle accidents, and temporary road closures annually. In 2017, North Tahoe Fire saw the snowiest January since 1952 in Tahoe City, with 135.5 inches in just one month, compared to the seasonal total from July 1, 2015 through June 30, 2016, which was 140 inches. That series of storms resulted in residents trapped in homes from such rapid snowfall, and 135 incidents of downed powerlines in January and February. On January 6, 2019, a snow event closed Interstate 80 from Colfax to the Nevada state line for the better part of a busy 3-day holiday weekend leaving roughly 70,000 motorists stranded in the greater Truckee-Tahoe area.

Vulnerability to and Impacts from Severe Weather: Freeze and Snow

The District experiences temperatures below 32 degrees during the winter months. Freeze can cause injury or loss of life to residents of the District. While it is rare for buildings to be affected directly by freeze, damages to pipes that feed building can be damaged during periods of extreme cold. Freeze and snow can occasionally be accompanied by high winds, which can cause downed trees and power lines, power outages, accidents, and road closures. Transportation networks, communications, and utilities infrastructure are the most vulnerable physical assets to impacts of severe winter weather in the County.

Freeze and snow events are a major concern to the District. Snow and winter weather conditions regularly result in utility outages and the closure of major transportation routes. During extreme winter events, response times to emergencies may also be extended. With altitudes ranging from 6,000 to 9,000 feet above msl, extreme cold/freezing temperatures can create significant problems. Of particular concern to the District is the vulnerability of the area to broken utilities and power failures during extreme weather events.

Assets at Risk

All District assets (from Table M-4) are at risk from this hazard.

Severe Weather: Heavy Rains and Storms (Hail, Lightning)

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile and Problem Description

Storms in the District occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the District falls mainly in the fall and spring months.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the District. All portions of the District are at risk to heavy rains. Most of the severe rains occur during the fall and spring months. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of severe storms in California, Placer County, and the District can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding.

The High Sierras receive severe weather annually. Heavy rains, hail and lightning are known to create adverse conditions in the backcountry, within the communities and roads of the District. These Heavy rain events can lead to flash flooding, hail damage, and lightning caused ignitions within the District and surrounding ridges and peaks. The District is known to respond to vehicle accidents during periods of severe and heavy rain as well. The District responded to incidents labeled as “Severe Weather & Natural Disaster” since 2016 as follows:

- **2017:** 5 incidents, including windstorm, tornado/hurricane assessment
- **2018:** 6 incidents, including assess severe weather or natural disaster damage, and two lightning strikes with no fire.
- **2019:** 3 incidents, including one lightning strike, no fire.
- **2020:** 1 incident for a flood assessment.

Three lightning fires were reported in the USFS area adjacent to our service area in 2018, but are not in our statistics because the fires were extinguished by USFS and NTFPD resources were canceled prior to arrival.

Vulnerability to and Impacts from Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the District. These events can cause localized flooding. Elongated events, or events that occur during times where the ground is already saturated can cause 1% and 0.2% annual chance flooding. Wind often accompanies these storms and has caused damage in the past. Hail and lightning occur infrequently in the District.

Actual damage associated with the effects of severe weather include impacts to property, critical facilities (such as utilities), and life safety. Heavy rains and storms often result in localized flooding creating significant issues. Roads can become impassable and ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Floodwaters and downed trees can break utilities and interrupt services.

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan.

Inside the District, severe weather often occurs. The greatest damages often occur from high winds.

Assets at Risk

No District facilities are likely at direct risk; however, the District does respond to emergencies during severe weather events.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence—Highly Likely

Vulnerability—High

Hazard Profile and Problem Description

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds are a primary factor in PSPS events.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though extremely rare in the higher elevations of Placer County, are another severe weather hazard that can affect areas of the Placer County Planning Area, primarily during the rainy season in the fall and spring.

Location and Extent

The entire District is subject to significant, non-tornadic (straight-line), winds. Each area of the County is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Portions of the County are also located in a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. This snow-removing ability is caused not only by warmer temperatures, but also the low relative humidity of the air mass coming over the mountain(s). They are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone.

Tornadoes, while extremely rare in Eastern Placer, can occur at any location in the County and District. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for winds and tornadoes. The District noted that since high winds is a regional phenomenon, events that affected the higher elevations of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.5.

The HMPC noted recent events in December of 2014 where winds caused damage to power lines. The HMPC provided the information in Figure M-2. During this event, a structure fire occurred that was the direct result of a wind event in which a tree fell onto an occupied residence. Fortunately all occupants escaped the building without injury. Winds in the District were recorded as high as 80 mph that date with gust on the surrounding mountains in excess 130mph. High winds can fan the flames of wildfire in the District as well, increasing the size of wildfires very quickly.

Figure M-2 December 11, 2014 Wind Caused Damages

FDID	Incident ID	Inci Num	Exp Alm Date	Alm Time	Stn Inci	Type Description	Addr Type	Addr Wild Number	St Pre
fix Street		Address	St Type	St Suffix	Addr 2				Apt Room
Xst Prefix	Xstreet		Xst Type	Xst Suffix	Rural				
31044_4TTS6BZLC	2014028592	0	12/12/2014	18:39:52	53	322	Motor vehicle accident with injuries	6937	
West Lake	6937 West Lake BLVD					1	N	6937	
31044_4TTS49WC5	2014028578	0	12/12/2014	14:39:47	51	321	EMS call, excluding vehicle accident with injury	925	3
North Lake	925 North Lake BLVD /3					1	N	925	
31044_4TTS1MNOE	2014028557	0	12/12/2014	09:55:34	56	321	EMS call, excluding vehicle accident with injury	1960	
Squaw Valley	1960 Squaw Valley RD					1	N	1960	
31044_4TTS1MMZW	2014028550	0	12/12/2014	09:24:36	53	444	Power line down	3590	
West Lake	3590 West Lake BLVD					1	N	3590	
31044_4TTS0LLL7	2014028542	0	12/12/2014	07:08:56	52	324	Motor Vehicle Accident with no injuries		
	North Side Brockway Summit					3	N		
31044_4TTRWK2DUE	2014028531	0	12/11/2014	23:08:58	52	611	North Dispatched & cancelled en route	8675	
North Lake	8675 North Lake BLVD					1	N	8675	
31044_4TTRV746WER	2014028517	0	12/11/2014	19:59:50	56	700	False alarm or false call, Other	255	
Squaw Valley	255 Squaw Valley RD					1	N	255	
31044_4TTRRMSIU	2014028465	0	12/11/2014	11:37:51	53	631	Authorized controlled burning	2980	
Electric	2980 Electric DR					1	N	2980	
31044_4TTRRUQA2	2014028463	0	12/11/2014	11:06:31	52	813	Wind storm, tornado/hurricane assessment	8872	
Brook	8872 Brook AVE					1	N	8872	
31044_4TTRRITQW	2014028462	0	12/11/2014	10:56:59	52	445	Arcing, shorted electrical equipment		
Fox	Fox ST & Brook AVE					2	N		
31044_4TTRRITQY	2014028456	0	12/11/2014	10:17:55	53	444	Power line down	796	
Cascade	796 Cascade CIR					1	N	796	
31044_4TTRQ4JV7	2014028440	0	12/11/2014	08:55:05	51	813	Wind storm, tornado/hurricane assessment	1749	
Washoe	1749 Washoe WAY					1	N	1749	
31044_4TTRQCHNN	2014028438	0	12/11/2014	08:38:10	53	444	Power line down	5255	
West Lake	5255 West Lake BLVD					1	N	5255	
31044_4TTRRITOD	2014028437	0	12/11/2014	08:32:58	51	444	Power line down	350	
Woodview	350 Woodview CT					1	N	350	
31044_4TTRQ8IQS	2014028435	0	12/11/2014	08:21:55	52	461	Building or structure weakened or collapsed	365	
Snowflake	365 Snowflake AVE					1	N	365	
31044_4TTRRITNT	2014028428	0	12/11/2014	07:31:02	53	461	Building or structure weakened or collapsed	5549	
Lagoon	5549 Lagoon RD					1	N	5549	
31044_4TTSROOKE	2014028427	0	12/11/2014	07:28:08	51	111	Building fire	1770	
Washoe	1770 Washoe WAY					1	N	1770	

Source: North Tahoe FPD

Since 2016, the District was affected by the following:

- 2017: 1 windstorm, tornado/hurricane assessment
- 2017: 135 instances of downed powerlines referenced above

Vulnerability to and Impacts from Severe Weather: Wind and Tornado

High winds are common occurrences in the District throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. High winds can impact critical facilities and infrastructure and can lead to power outages. Wind can also drive wildfire flames, spreading wildfires quickly. During periods of high winds and dry vegetation, wildfire risk increases. High winds that occur during periods of extreme heat can cause PSPS events to be declared in the County. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan.

Impacts from high winds in the District will vary. Future losses from straight line winds include:

- Downed trees
- Power line impacts and economic losses from power outages
- Increased PSPS events
- Occasional building damage, primarily to roofs

North Tahoe Fire received 42 Fire Weather Watch or Red Flag Warnings since the 2016 LHMP. There is a direct correlation between red flag/critical fire weather and catastrophic wildfire. Red flag warnings are now factored into triggering PSPS events because of the substantial increase in fire risk and risk of catastrophic wildfire when low humidity is combined with high winds.

The Emerald Fire occurred adjacent to the District's service area, burning 176 acres of forest in October 2016 during a red flag weather event. The District stood up our CERT team and our EOC to support the incident.

Assets at Risk

All District assets (from Table M-4) are at risk from this hazard.

Tree Mortality

Likelihood of Future Occurrence—Likely

Vulnerability—High

Hazard Profile and Problem Description

One of the many vulnerabilities of drought in Placer County is the increased risk of widespread tree mortality events that pose hazards to people, homes, and community infrastructure, create a regional economic burden to mitigate, and contribute to future fuel loads in forests surrounding communities.

During extended drought, tree mortality is driven by a build-up in endemic bark beetle populations and exacerbated by latent populations of a suite of native insects and disease. Non-native forest pests (insects and/or pathogens) can also contribute to tree mortality events.

Location and Extent

Onset of tree mortality events can be relatively fast; however conditions – such as high stand densities – that lead to tree mortality accumulate slowly over time. Duration of tree mortality is lengthy, as once the tree dies, it remains in place until removed by human activity, wildfire, or breakdown of the wood by nature. Many areas in Placer County have seen increases in tree mortality. The County has mapped these areas, and that map was shown in Section 4.3.18 of the Base Plan. Using a color legend, the map provided by CAL FIRE shows a scale of:

- Deep burgundy depicting areas with more than 40 dead trees per acre
- Red depicting 15 - 40 dead trees per acre
- Orange depicting 5 -15 dead trees per acre
- Yellow depicting 5 or less dead trees per acre

In the past decade, mortality has increased in the eastern portion of Placer County. During the 2012-2018 drought, the state of California Tree Mortality Task force designated multiple Tier 1 and Tier 2 High Hazard Zones where tree mortality posed an elevated risk to human health, properties, and resource values. A number of Placer County areas were designated during this event and the majority of Placer County watersheds were designated as Tier 2 high hazard zones because of the significant levels of tree mortality, along with numerous Tier 1 High hazard “hot spots”. A map of these areas is shown in in Section 4.3.18 of the Base Plan.

Past Occurrences

There have been no state or federal disasters in the County related directly to tree mortality, though it has most likely contributed to the intensity of past wildfires in the County. Those events are shown in the Past Occurrences section of Wildfire below. In 2015, then-Governor Edmund G. Brown Jr. proclaimed a state of emergency due to the extreme hazard of the dead and dying trees. Following the proclamation, 10 counties were determined to be most affected, which included Placer County. Placer County proclaimed a local emergency due to tree mortality conditions on Dec. 8, 2015.

Vulnerability to and Impacts from Tree Mortality

Placer County is unique in that many residential and business areas of the community are in the wildland urban interface/intermix with the forest. Trees in these interface/intermix areas are particularly vulnerable to insect and/or drought driven mortality because of the additional stressors that urban environments impose on trees (i.e. Soil compaction, altered hydrology, physical damage, heat islands etc.). This exacerbates the occurrence of tree mortality within the populated settings of the County.

Dead trees are a hazard to the general public and forest visitors, but the risk of injury, death, property damage or infrastructure damages varies depending how the hazard interacts with potential targets. Dead

trees within the wildland urban intermix or wildland urban interface or urban areas therefore pose a greater risk to due to their proximity to residents, businesses, and road, power, and communication infrastructure.

Dead trees may fall or deteriorate in their entirety or in part – either mechanism has the potential for injury, death, or inflicting severe damage to targets. As the time since tree mortality increases, so does the deterioration of wood and the potential for tree failure.

Placer County is unique in that many residential and business areas of the community are in the wildland urban interface/intermix with the forest. Trees in these interface/intermix areas are particularly vulnerable to insect and/or drought driven mortality because of the additional stressors that urban environments impose on trees (i.e. Soil compaction, altered hydrology, physical damage, heat islands etc.). This exacerbates the occurrence of tree mortality within the populated settings of the County.

Dead trees have become a concern for the District due to the exacerbation of fire risk, fuel loading and direct threat to life and property when hazard trees are located within falling distance of homes.

Assets at Risk

All District assets from Table M-4 are at indirect risk from this hazard.

Wildfire

Likelihood of Future Occurrence–Highly Likely

Vulnerability–Extremely High

Hazard Profile and Problem Description

Wildland fire and the risk of a conflagration is an ongoing concern for the North Tahoe FPD. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas.

Wildfire and Power Shortage/Power Failure

The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of

outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power outages can be found in Section 4.3.2 of the Base Plan.

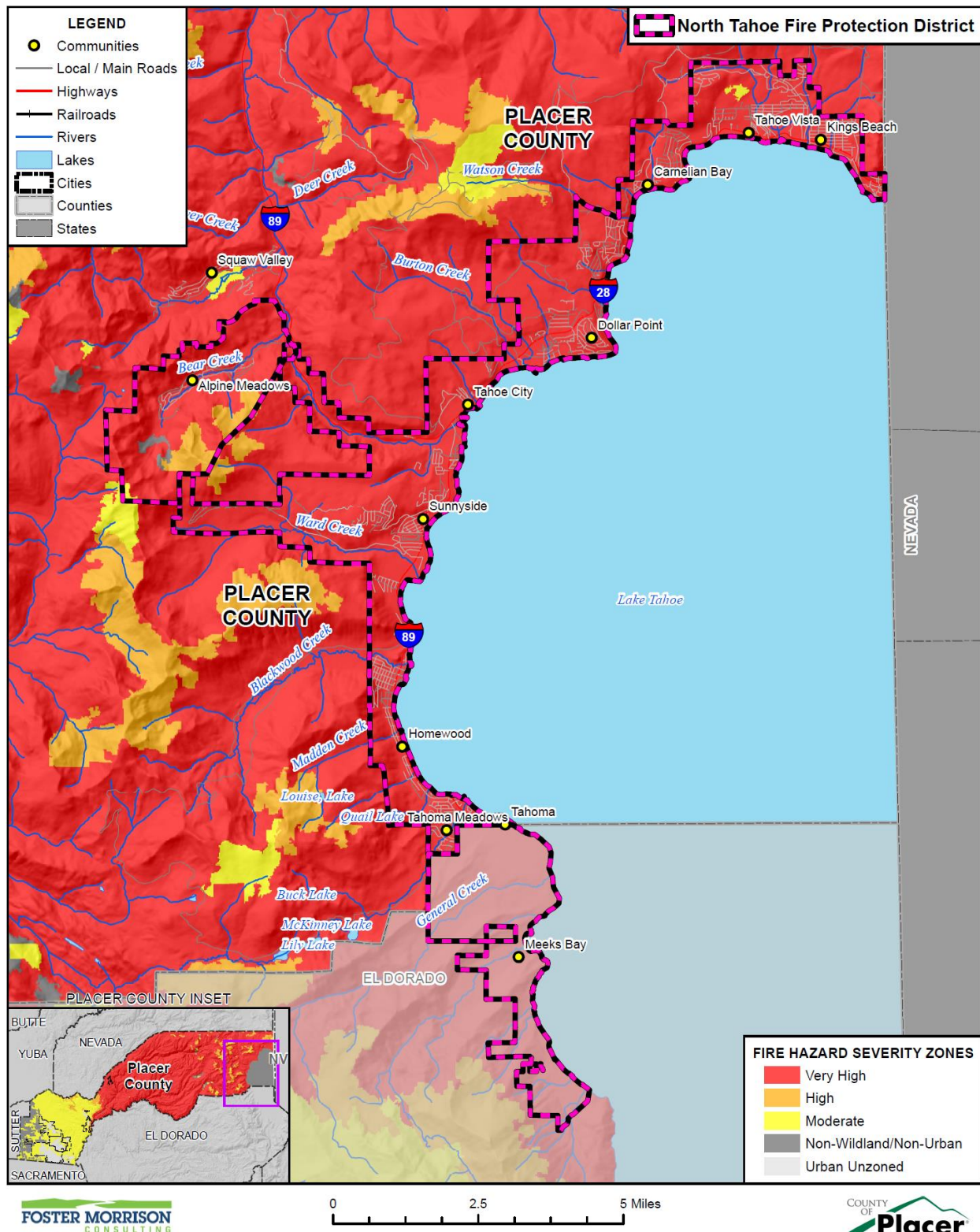
Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, including periods of high winds, high temperatures, and low humidity, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. Though the area is not served by one the three largest energy companies, Liberty Utilities can institute a PSPS if the CPUC calls for it. In partnership with fire weather experts, Liberty monitors real-time weather data and forecasts and regularly tests fuel moisture during the fire season. If it is determined that the forecasted conditions meet or exceed safety thresholds, Liberty will initiate a PSPS. More information on PSPS criteria can be found in Section 4.3.2 of the Base Plan.

Location and Extent

Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.19 of the Base Plan, wildfire maps for the North Tahoe FPD were created. Figure M-3 shows the CAL FIRE FHSZ in the District. As shown on the maps, the fire hazard severity zones within the District are in the Very High range.

Figure M-3 North Tahoe FPD – Fire Hazard Severity Zones



Fire Hazard Severity Zone (FHSZ) is a mapped area that designates zones (based on factors such as fuel, slope, and fire weather) with varying degrees of fire hazard (i.e., moderate, high, and very high). FHSZ maps evaluate wildfire hazards, which are physical conditions that create a likelihood that an area will burn over a 30- to 50-year period. They do not consider modifications such as fuel reduction efforts.

While FHSZs do not predict when or where a wildfire will occur, they do identify areas where wildfire hazards could be more severe and therefore are of greater concern. FHSZs are meant to help limit wildfire damage to structures through planning, prevention, and mitigation activities/requirements that reduce risk. The FHSZs serve several purposes: they are used to designate areas where California's wildland urban interface building codes apply to new buildings; they can be a factor in real estate disclosure; and local governments consider fire hazard severity in the safety elements of their general plans.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time, or may have durations lasting for a week or more.

Past Occurrences

There has been five state and six federal disaster declarations for Placer County from fire. These can be seen in Table M-9.

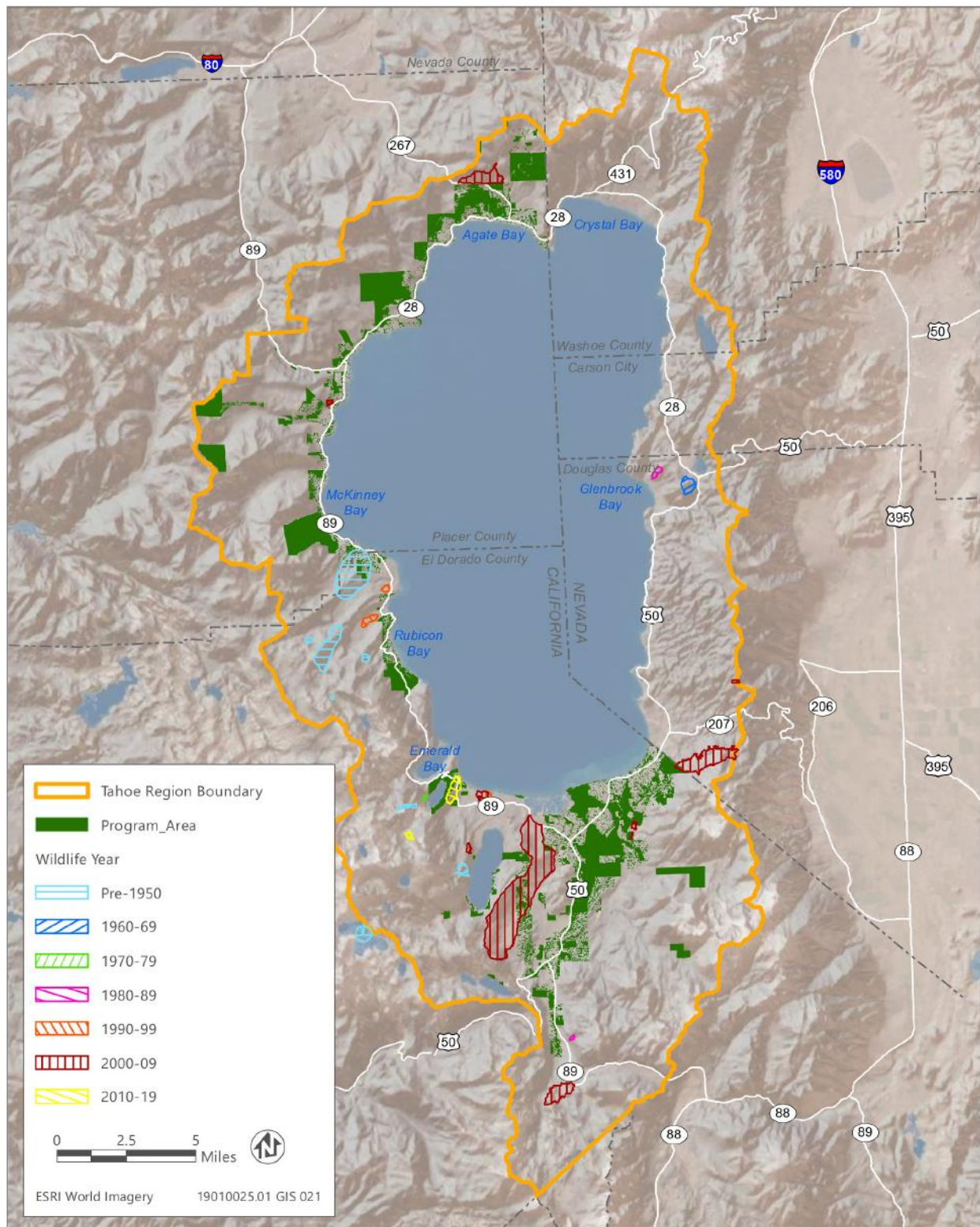
Table M-9 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	1961, 1965, 1973, 1987, 2010	6	2002, 2004, 2008, 2009, 2014 (twice)

Source: Cal OES, FEMA

Wildfire history in the North Tahoe area can be seen on Figure M-4.

Figure M-4 Tahoe Basin Wildfire History



Source: Draft Tahoe Program Timberland Environmental Impact Report 2020

A notable wildfire to impact the District was the Washoe Fire in August 2007. This fire occurred in the wildland urban interface area of Tahoe Park and Tahoe Woods subdivision, along the west shore of Lake Tahoe. Although no lives were lost, the fire destroyed 5 residential structures and encompassed 19 acres. Power and gas utilities incurred damages. There were also losses to timber assets, loss of watershed protection, and loss of the aesthetic value of a scenic corridor. This event caused major disruptions to west shore and Tahoe City traffic and business on a busy summer weekend. Highway 89 in West Lake was closed for a period of time.

Due to droughts in the North Tahoe FPD, widespread wildfires have occurred in or near District boundaries. In the first half of the 2010s, several large fires have impacted the Lake Tahoe Basin in various ways. The Angora fire burned over 300 structures and the King Fire burned almost 100,000 acres to the west of the basin and almost burned into the basin.

From 2016 - 11/17/2020 NTFPD responded to 115+ Wildland fire incidents. These include: Brush or brush and grass mixture fires, forest/woods/wildland fires, and natural vegetation fires. Almost all of these wildland fires required crews to establish fire lines, contain, and extinguish. Through mutual and automatic aid, NTFPD sent individual resources and strike teams out on the following large incidents in 2020.

Table M-10 NTFPD – Fires in 2020

Name of Fire	Dates	Personnel Assigned to Fire
Poeville	6/27-6/28	Chief STEN, B51 Captain, Engineer, 2 FF/P
Arrowcreek	7/21	Chief STEN, E52 Captain, Engineer, FF/P
Numbers	7/6-7/8	B52 Captain, Engineer, FF/P
Mineral	7/15-7/24	Fire Line Medic
Hog	7/19-7/29	STEN(t), B51 Captain, Engineer, 2 FF/P
Gold	7/24-7/30	Line Medic
North	8/2-8/5	B51 Captain, FF, F/P
Apple	8/3-8/14	Fire Line Medic
Red Salmon Complex	8/7-8/30	Fire Line Medic
Loyalton	8/14-8/30	BC STEN, STEN(t), B51 Captain, 2 FF/P
North Complex	9/3-9/17	Fire Line Medic
North Complex	9/3-9/18	Fire Line Medic
Creek Fire Fresno	9/9-9/25	Division Supervisor(t)
North Complex 4233C	9/13-9/29	B52 Captain, Engineer, FF/P, FF
North Complex/Zogg 4233C	9/29-10/6	B51 Captain, Engineer, 2 FF/P
Silverado 4235A	10/27-	E51 Captain, Engineer, 2 FF/P
Creek Fire Fresno	10/30-	Communications Technician(t)

Source: NTFPD

Vulnerability to and Impacts from Wildfire

Risk and vulnerability to the Placer County Planning Area and the District from wildfire is of significant concern, with some areas of the Planning Area being at greater risk than others as described further in this section. High fuel loads in the Planning Area, combined with a large built environment and population, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and potentially catastrophic fires. During the nearly year around fire season, the dry vegetation and hot and sometimes windy weather results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the County and the District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands, and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the District. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the District by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the District; smoke and air pollution from wildfires can be a severe health hazard.

Although the physical damages and casualties arising from large fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate PSPSs which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

All communities within the District are listed on the National Fire Plan's "Communities at Risk" list as set forth in Section 4.3.2 of the main plan.

Over one hundred years of aggressive fire suppression under the national fire suppression policy has rendered wildlands severely overgrown. Much of the private land in the District's area is in the wildland urban interface with increasing residential development.

According to the North Tahoe FPD, the following areas of the District were prioritized for projects because of their population, values at risk, and fuel availability:

- Tahoe City
- Lake Forest
- Highlands

- Dollar Point
- Cedar Flats
- Carnelian Bay
- Agate Bay
- Tahoe Vista
- Kings Beach
- Alpine Meadows
- Kingswood
- Talmont
- Tahoe Park
- Pineland
- Timberland
- Skyland
- Tahoe Pines
- Tahoe Swiss Village
- Homewood
- Chamberlands
- Tahoma
- Meeks Bay
- Rubicon
- McKinney Estates.

As more people move into the area and impacts from recreational demands increase, there will be more human-caused wildfire starts each year. And the increased number of widely scattered homes within the District adds greatly to the danger, complexity, and cost of fighting these fires.

Currently, many of the communities in the District are limited to one route access and egress in the event of a major wildfire. Historically, these routes are closed during major events, stranding many people, including visitors, away from their families and homes. So far there has been no loss of life attributed to the limited evacuation routes, but it is likely only a matter of time before people are cut off and trapped by a major fire event.

Forest overgrowth due to the efficiency of modern firefighting techniques, and to society's current election to limit forest thinning and harvesting, is a serious problem. If wildfire does not impact the forest first, native insects will eventually kill millions of trees. Explosions in insect populations usually start during a drought, when the lack of water combined with too many trees per acre render the trees too weak to fight off the insect attacks. Without a change in management practices on public lands, there is little hope of avoiding a kill off of trees similar to the kill off experienced by other national forests.

A notable recent wildfire to impact the District was the Washoe Fire in August 2007. This fire occurred in the wildland urban interface area of Tahoe Park and Tahoe Woods subdivision, along the west shore of Lake Tahoe. Although no lives were lost, the fire destroyed 5 residential structures and encompassed 19 acres. Power and gas utilities incurred damages. There were also losses to timber assets, loss of watershed protection, and loss of the aesthetic value of a scenic corridor. This event caused major disruptions to west shore and Tahoe City traffic and business on a busy summer weekend. Highway 89 in West Lake was closed for a period of time.

Due to recent droughts in the North Tahoe FPD, widespread wildfires have occurred in or near District boundaries. In the last few years several large fires have impacted the Lake Tahoe Basin in various ways. The Angora fire burned over 300 structures and the King Fire burned almost 100,000 acres to the west of the basin and almost burned into the basin. These are both described in the base plan in Section 4.2.17.

Wildland fires are a significant threat to regional power distribution systems. Power outages caused by wildland fires directly affect the safety of district residents, drastically restrict critical water system operations, and severely limit available water supplies for fire suppression.

Assets at Risk

All District assets from Table M-4 are at risk from this hazard. NTFPD is almost entirely classified as a Very High Fire Hazard Severity Zone in CAL FIRE FRAP maps

M.6 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

M.6.1. Regulatory Mitigation Capabilities

Table M-11 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the North Tahoe FPD.

Table M-11 North Tahoe FPD Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	N	Placer County and TRPA Authority
Capital Improvements Plan	N	
Economic Development Plan	N	Placer County and TRPA Authority
Local Emergency Operations Plan	Y	2017 Placer County Emergency Operations Plan
Continuity of Operations Plan	N	
Transportation Plan	N	Placer County and Tahoe Transportation District Authority
Stormwater Management Plan/Program	N	Placer County, TRPA, Tahoe RCD, Lahontan RWQCB Authority

Engineering Studies for Streams	N	Placer County and Lahontan Regional Water Quality Control Board Authority
Community Wildfire Protection Plan	Y	2015 Lake Tahoe CWPP: Addresses hazards and includes mitigation strategies and actions
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation):	Y	
Tahoe Program Timberland Environmental Impact Report (Tahoe PTEIR)	Y	The Tahoe PTEIR is a Program Timberland EIR developed to address a long-term program of forest management and fuel reduction; Addresses hazards and includes mitigation strategies and actions
Community Risk Assessment/Community Risk Reduction Plan	N	NTPFD has identified the need for a formal CRA/CRRP and has applied to FEMA-AFG-FP&S to fund this risk assessment project
2018 Standards of Coverage and Deployment Plan (SOC)	Y	Addresses hazards and includes mitigation strategies and actions
Lake Tahoe Climate Change Adaptation Action Portfolio (CAAP)	Y	The CAAP is nearing completion, and addresses hazards and includes mitigation strategies and actions
Lake Tahoe Basin Multi-Jurisdictional Fuel Reduction and Wildfire Prevention Strategy		Addresses hazards and includes mitigation strategies and actions
Lake Tahoe Basin Forest Action Plan Lake Tahoe Basin Fuel Reduction and Wildfire Prevention Incident Action Plan		Addresses hazards and includes mitigation actions for that calendar year
Building Code, Fire Code, Local Ordinance, Permitting, and Inspections	Y/N	Are codes adequately enforced?
Building Code	N/A	Placer County Authority
Building Code Effectiveness Grading Schedule (BCEGS) Score	N/A	
Fire department ISO rating:	Y	Rating: 3/3Y
Site plan review requirements	Y	Yes
Local Fire Prevention Ordinance	Y	Yes, Adoption and amendment of the CA Fire Code
Defensible Space Inspection Program	Y	Yes, Defensible space enforced through: Placer County Hazardous Vegetation and Combustible Material Ordinance (6015-B), El Dorado County Vegetation Management and Defensible Space Ordinance (5101), Assembly Bill 38, CALFIRE, and for building permit finalization.

		Is the ordinance an effective measure for reducing hazard impacts?
Land Use Planning and Ordinances	Y/N	Is the ordinance adequately administered and enforced?
Zoning ordinance	N	Placer County Authority
Subdivision ordinance	N	Placer County Authority
Floodplain ordinance	N	Placer County Authority
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Y	Wildfire (local burning restrictions & noncombustible class a roof covering)
Flood insurance rate maps	N	Placer County Authority
Elevation Certificates	N	Placer County Authority
Acquisition of land for open space and public recreation uses	N	Placer County, USFS, California Tahoe Conservancy, TRPA Authority
Erosion or sediment control program	N	Placer County, TRPA, and Lahontan RWQCB Authority
Other		
How can these capabilities be expanded and improved to reduce risk?		
Expand capacity to implement these plans, codes and ordinances.		

Source: North Tahoe FPD

As indicated above, the District has several programs, plans, policies, and codes and ordinances that guide hazard mitigation. Some of these are described in more detail below.

Tahoe Community Wildfire Protection Plan, 2015

In 2015 the Tahoe Community Wildfire Protection Plan was created (2015 CWPP). This plan encompasses all areas of the Alpine Meadows and North Tahoe FPD that are at risk and directly outlines hazards and mitigations needed to preserve lives and property in these areas in the setting of a wildland fire incident. It is incorporated by reference here in support of the 2015 update to this document (Tahoe FFT.org). This website is hosted by the Tahoe Living with Fire Organization.

Integrated Vulnerability Assessment of Climate Change in the Lake Tahoe Basin (2020)

Climate change is amplifying the background stressors on natural resources, infrastructure, and communities in the Lake Tahoe Basin (Basin). Land managers and policy-makers are increasing the Basin's resilience and ability to adapt. Doing this now protects people and nature, and saves money. This vulnerability assessment provides residents, visitors, businesses, and public agencies with state-of-the-art information on how patterns of temperature and precipitation will change (called "impacts"), and how these

patterns will affect the things people care about (called “implications”). The common scenarios and analyses provided will help public agencies and stakeholder organizations anticipate climate change implications, and better design and maintain their future projects that improve the quality of life, land, and waters in Tahoe. This assessment is written for a technical audience, and will feed directly into a Basinwide adaptation action plan written for all audiences.

North Tahoe Fire Protection District and Meeks Bay Fire Protection District Standards of Coverage and Deployment Plan (2018)

This report serves as the North Tahoe Fire Protection District and Meeks Bay Fire Protection District Standards of Coverage and Deployment Plan. It follows closely the Center for Fire Public Safety Excellence (CPSE) Standards of Coverage model that develops written procedures to determine the distribution and concentration of a fire and emergency service agency’s fixed and mobile resources. The purpose for completing such a document is to assist the agency in ensuring a safe and effective response force for fire suppression, emergency medical services, and specialty response situations.

This report focuses on the area within the boundaries of the two fire districts. Although the districts serve a larger area, those areas are served by contract with other entities.

It is important to understand that there are no mandatory federal or state regulations directing level of service, fire service response times, or outcomes. The body of regulations for the fire service provides that if fire services are provided, it must be done with the safety of the firefighters and citizens in mind.

Creating a Standards of Coverage and Deployment Plan document requires that a number of areas be researched, studied, and evaluated. This report will begin with an overview of both the community and the agency. Following this overview, the plan will discuss topics such as community risk assessment, critical task analysis, agency service level objectives, and distribution and concentration measures. The report will provide analysis of historical performance and will conclude with policy and operational recommendations.

Lake Tahoe Basin Fuel Reduction and Wildfire Prevention Incident Action Plan (2019)

To protect lives, property and the environment of the Lake Tahoe Basin from wildfire by implementing prioritized fuels reduction projects and engaging the public in becoming a Fire Adapted Community. Goals of this Plan are:

- Create fire adapted communities.
- Restore and maintain fire resilient landscapes.
- Support effective and efficient wildfire response.

Objectives of this include:

- Develop and implement prioritized fuel reduction treatments across jurisdictions to address risks to ecosystems and communities, and to facilitate safer and more successful suppression.
- Develop and implement fuels reduction projects that provide multiple resource benefits, including the enhancement of water quality, wildlife habitat, forest vegetation, recreation and scenic resources, and carbon sequestration.

- Implement mitigation strategies and community action plans to create communities where citizens are engaged and active in preparing for wildfire.
- Provide consistent and coordinated messaging and public involvement that reinforce fire adapted community concepts.
- Coordinate projects to streamline planning, leverage resources, and increase efficiency and effectiveness.
- Support increased funding and capacity for forest management, wildfire prevention, and community engagement.
- Increase restoration byproduct utilization, including biomass.
- Measure progress and monitor outcomes to inform future TFFT activities.

Lake Tahoe Basin Forest Action Plan (2019)

The Forest Action Plan (Plan) contains three overarching strategies that support completing and maintaining all wildland-urban interface treatments, and implementing large-landscape restoration:

1. Scale up to match the scale of the solution to the scale of the threat.

- Develop and Implement Landscape Scale Initiatives
- Streamline Planning and Permitting
- Create Powerline Resilience Corridors

2. Build capacity for all phases of the forest landscape management cycle.

- Expand the Restoration Workforce
- Adapt for Organizational Efficiency
- Strategically Use Prescribed Fire
- Increase Restoration Byproduct Utilization

3. Leverage technology for rapid, large-scale, more efficient implementation.

- Launch the Technology Innovation Sprint
- Improve Decision Making through Better
- Data Management
- Enable Rapid Response through a Wildfire
- Camera Network

The Plan aligns with state and federal plans and mandates that call for increasing the pace and scale of forest management including Nevada’s Cohesive Strategy Implementation Plan and Forest Action Plan, California Executive Orders B-52-18 and N-05-19, and USDA Forest Service Region 5’s Ecological Restoration Leadership Intent. The Plan implements the Forest Health focus area of the Basin’s Environmental Improvement Program, the signature partnership to restore and protect Tahoe’s natural resources.

Tahoe Program Timberland EIR (Draft 2020)

The PTEIR has been prepared to support an increase in pace and scale of forest management activities on the California side of the Tahoe Basin to reduce the risk of loss of lives and property, reduce fire suppression costs, protect natural resources from wildfire, and improve forest health in and adjacent to the WUI on the

California side of the Lake Tahoe Basin. The project-by-project approach that has typically been used to comply with California Environmental Quality Act (CEQA), California Forest Practice Act (FPA), California Forest Practice Rules (CFPR), and other regulatory requirements can lead to inefficiencies, delays, excess costs, and inconsistencies in project planning. In addition, a project-by-project approach to fuel reduction planning and environmental review provides limited opportunities to analyze and understand the long-term and cumulative effects of forest management programs. The Tahoe PTEIR more efficiently and comprehensively evaluates the environmental effects of the proposed program to facilitate an increase in the pace and scale of fuel reduction treatments.

The statement of objectives below describes the underlying purposes of the PTEIR and expresses the role of vegetation treatment in implementing state policies and plans for wildfire risk reduction, greenhouse gas (GHG) reduction, and management of natural and working lands. The objectives of the PTEIR are to:

- reduce the risk of catastrophic wildfires that could damage Lake Tahoe Basin forests, watersheds, habitats, and communities;
- increase Lake Tahoe Basin forest resilience to effects of climate change, including prolonged drought, pest and disease outbreaks and increased tree mortality;
- protect and restore meadow and riparian ecosystems, and forest habitat quality in the Lake Tahoe Basin;
- develop and implement all-lands fuel reduction, forest health improvement, and restoration projects that deliver multiple community and ecosystem service benefits; and
- increase the pace and scale of fuel reduction projects to assist in achieving the goals of Executive Order B-52-18

Homewood Evacuation and Life Safety Report (2016)

This report was commissioned by the North Tahoe Fire Protection District for the purposes of providing an evaluation and clarification of Homewood's commitments and mitigation and to provide further details as needed for construction standards, fire safety measures, evacuation procedures and shelter-in-place concepts to insure that the Project will not result in any significant adverse impacts on wildfire evacuation risks on the West Shore during construction or operation and will not exacerbate any existing wildfire evacuation risks in the Lake Tahoe region given the changed circumstances in the Project Area since the County's and TRPA's approvals in 2011.

Furthermore, to accomplish the goal of not exacerbating current evacuation systems for neighboring residents and visitors, this report evaluates Homewood's commitment to providing areas of refuge to increase life safety protection in the event of a fire requiring regional evacuation, in which residents outside of the Project boundary can find refuge in a wildland fire scenario.

Codes and Ordinances

Avalanche

Placer County's avalanche management program defines Potential Avalanche Hazard Areas (PAHAs) where the minimum probability of avalanche occurrence is 1 in 100 per year or where avalanche damage has already occurred. According to the Placer County Avalanche Ordinance the following information must be disclosed in PAHAs:

- Identification that a structure is within a PAHA;
- A warning that avalanche control work is conducted in the area and avalanche warnings will be provided as feasible; and
- Identification of sources that provide weather information and general information on avalanches.

In addition, the County limits construction as necessary in PAHAs and will not issue a building permit for construction in a PAHA without certifying that the structure will be safe under the anticipated snow loads and conditions of an avalanche.

M.6.2. Administrative/Technical Mitigation Capabilities

The board is comprised of 5 members representing 5 regions within the Lake Tahoe basin and is selected by registered voters within the District. The board serves as the governing body for the District's more than 22,000 residents. Members of the board are elected by geographical Division for 4 years. The Board of Directors approves District Rules and Regulations and, through the Fire Chief, ensures adherence to District policies. District policy and actions may be adopted by motion, or more formally, by resolution.

The North Tahoe FPD provides services through Eight fire stations: Alpine Meadows, Tahoe City, Homewood, Meeks Bay, Tahoma, Dollar Hill, Carnelian Bay, and Kings Beach. These fire stations are staffed by 60 to 65 uniformed and support personnel. The Assistant Chief oversees the operations division which includes service delivery, communications, apparatus repair, replacement, and purchasing. The Assistant Chief is responsible for engine company staffing, alarm response guidelines, and standard operating procedures.

North Tahoe FPD's dispatch services are provided by the Grass Valley Emergency Command Center in Grass Valley, CA. The dispatch center uses computer aided dispatching to ensure optimal resource monitoring and management utilizing the closest resource backed up by station cover assignments in a multi-tiered alarm structure.

For apparatus maintenance and repair the District employs 1 full-time Fire Mechanic and two part-time assistants. The District pursues an aggressive vehicle replacement policy which refurbishes engines after 10 years, places them in reserve after 20 years and replaces them after 25 years. District ambulances are designed to have the ambulance module remounted on a new chassis every 5 years until replacement. The North Tahoe Fire Protection District maintenance and repair facility personnel ensure the District purchases only items of a specified quality at the least expense to the taxpayers. The District maintenance and repair facility personnel are charged with all tasks associated with providing a safe and reliable apparatus fleet at the lowest possible expense to the taxpayers. Table M-12 identifies the personnel responsible for activities related to mitigation and loss prevention in the District.

Table M-12 North Tahoe FPD's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	Placer County
Mitigation Planning Committee	N	-

Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Forest Fuels Program
Mutual aid agreements	Y	Multiple in place and on-going with allied agencies
Other		
Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	N	-
Floodplain Administrator	N	-
Emergency Manager	N	1 Fire Chief, 3 Battalion Chiefs, 2 Division Chiefs and staff
Community Planner	N	-
Civil Engineer	N	-
GIS Coordinator	Y	GIS Program is developing
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Placer County Sherriff 911, Caltrans message signs, NTFPD sign trailers, fire danger signs. Placer County Code RED, Emergency radio system 1630 AM, Website and social media. Alert Tahoe Cameras, CERT
Hazard data and information	Y	Occupancy pre-plan capabilities, MDT grant, Pre-attack plans, Tahoe PTEIR, Placer County Tree Mortality, FRAP FHSZ maps.
Grant writing	Y	Admin and Prevention staff
Hazus analysis	N	County GIS
Other		
How can these capabilities be expanded and improved to reduce risk?		
Additional grants and further program development.		

Source: North Tahoe FPD

M.6.3. Fiscal Mitigation Capabilities

Table M-13 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table M-13 North Tahoe FPD's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	No. Yes.
Authority to levy taxes for specific purposes	Y	Yes, Special Tax and Tax Assessments have been used for operations and pre-hazard mitigation. Yes.

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Fees for water, sewer, gas, or electric services	N	-
Impact fees for new development	Y	Yes. Community Facilities District and AB1600 Mitigation Fees for capital purchases. Yes
Storm water utility fee	N	-
Incur debt through general obligation bonds and/or special tax bonds	Y	No. Yes.
Incur debt through private activities	Y	No. Yes
Community Development Block Grant	Y	No. Yes
Other federal funding programs	Y	Yes: FEMA AFG, SAFER, PDM, GEMT, IGT, and BLM-SNPLMA have all been awarded for mitigation projects. Yes
State funding programs	Y	Yes. JAC, CalOES, CALFIRE, OTS for operations, training, equipment and personnel program grants. Yes
Other		
How can these capabilities be expanded and improved to reduce risk?		
On-going program management and opportunities.		

Source: North Tahoe FPD

M.6.4. Mitigation Education, Outreach, and Partnerships

Table M-14 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table M-14 North Tahoe FPD's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	CERT, Fire Adapted Communities, Fire Safe Council, NFPA Firewise, Tahoe Fund, League to Save Lake Tahoe
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	2015 Emergency Preparedness and Evacuation Guide, Tahoe Living with Fire, portable message signs
Natural disaster or safety related school programs	Yes	Fire safety week for the schools program
StormReady certification	No	
Firewise Communities certification	Yes	Forest Fuels serves as a Firewise Regional Coordinator to expand the number of Firewise communities

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Public-private partnership initiatives addressing disaster-related issues	Yes	Tahoe Fund
Other		
How can these capabilities be expanded and improved to reduce risk?		
Continued program management and development of mitigation related programs.		

Source: North Tahoe FPD

The North Tahoe FPD has automatic aid agreements with bordering Districts and mutual aid agreements with other fire agencies throughout the area. The District relies heavily upon this aid from their neighbors. Due to the high costs that are associated with a resort-based economy, three-quarters of the North Tahoe FPD personnel live outside of the area served. This requires additional personnel from neighbors to respond and assist with incidents that are within the operational area.

The District is also a participating member of the Sierra Front WildFire Cooperators, a bi-state, multi-agency organization. The cooperators address numerous issues pertaining to wildfire suppression, prevention and public education.

The District also works with other agencies on wildfire-related matters. Working with professional fire experts from the U.S. Forest Service and California Department of Forestry and Fire Protection helps ensure that the District's work complements state and federal work and is up to standard for controlling wildfires.

In implementing many of the fuels management projects, the North Tahoe FPD works closely with the Tahoe Fire and Fuels Team which consists of representatives of Tahoe Basin fire agencies, CAL FIRE, Nevada Division of Forestry and related state agencies, the Nevada Fire Safe Council, the Tahoe Regional Planning Agency, the USDA Forest Service, conservation districts from both states, the California Tahoe Conservancy, and the Lahontan Regional Water Quality Control Board. Coordination of fuels reduction projects in the Tahoe Basin is overseen by a Multi-Agency Committee (MAC) comprised of the above agencies.

The District participates in the Lake Tahoe West Restoration Partnership. The Lake Tahoe West Restoration Partnership (Lake Tahoe West) is a collaborative effort to restore the resilience of forests, watersheds, and communities on 59,000 acres of Lake Tahoe's west shore. Wildfire, drought, and insects and disease epidemics—pressures that are amplified by climate change—threaten forests, watersheds, and communities across the Lake Tahoe West landscape. The goal of Lake Tahoe West is to restore the resilience of the west shore's forests, watersheds, recreational opportunities, and communities to such threats. The planning area includes approximately 59,000 acres of federal, state, local, and private lands, from Emerald Bay to Squaw Valley. Lake Tahoe West is a multi-stakeholder collaborative initiative convened by California Tahoe Conservancy, U.S. Forest Service Lake Tahoe Basin Management Unit, California State Parks, Tahoe Regional Planning Agency, Tahoe Fire and Fuels Team, and National Forest Foundation. The District's primary mitigation strategies and actions will be through implementation of vegetation management treatments consistent with the Tahoe PTEIR program.

M.6.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation efforts that include the following:

The District is involved in a variety of mitigation activities including, public education, fuels management projects, and other activities to reduce fuel loads and fire risk. These mitigation activities include:

- Public presentations and defensible space inspections
- Working with Homeowner's Association's through Fire Adapted Communities, Living with Fire and encouraging NFPA's Firewise recognition program
- Public outreach via website, social media, local paper and school education programs
- Fire & Life Safety structural plan review program
- Forest Fuel's management program
- Advise and assist with water system infrastructure improvements
- Details on some of the recent, ongoing mitigation projects are noted below.

Fuel Reduction Projects

The North Tahoe FPD is a member of the Tahoe Fire and Fuels Team and has partnered with the Meeks Bay Fire Protection District and the North Lake Tahoe Fire Protection Districts in Incline Village, Nevada to develop and implement a Coordinated Fuels Management and Defensible Space Program.

These organization's fuels management personnel and resources are shared and can be utilized in Meeks Bay, North Tahoe and the North Lake Tahoe Fire Districts as determined by project priority and funding availability. The combined fuels reduction dedicated staff includes a 20 person Type 2-IA hand crew, a 10 person fuels reduction module, a three person chipping crew, a registered Forester, and a NWCG qualified Type 2 Prescribed Fire Burn Boss. The Fuels program continuously applies for multiple grants through federal and state sources to aid in the continuation of a comprehensive fuels management program.

- 2019 WUI Fuels Reduction:
 - ✓ FEMA – North Tahoe Fire Hazardous Fuels Reduction and Defensible Space Project treated 154 lots/27 acres of CTC lots in Kings Beach.
 - ✓ SNPLMA – North Tahoe CWPP Project treated 80 acres of hand thin and pile within NTPUD ownership (Gentry property and Regional Park)
- 2020 WUI Fuels Reduction:
 - ✓ FEMA – North Tahoe Fire Hazardous Fuels Reduction and Defensible Space Project treated 106 lots/30 acres of CTC lots in Tahoe Vista, Agate Bay, Carnelian Bay, Cedar Flat, Dollar Point, Lake Forest and Tahoe City
 - ✓ SNPLMA – North Tahoe CWPP Project treated 57 acres of hand thin and pile within NTPUD's Regional Park.

Fuels Reduction: Chipper Program

The North Tahoe FPD provides residential curbside chipping to assist with removal of biomass from defensible space work to all properties within the District's geographic boundaries. This program is equivalent to about 100-300 acres of treatment in the district annually. Chipping statistics from 1999 to 2020 are provided in Table M-15. The District chipping statistics vary greatly in availability by year and

in numbers reported as the reporting methods and funding mechanisms have varied over the years. The reason for the large increase in these numbers in 2007 was due to the Angora Fire in 2006 that resulted in an increased need for defensible space in the region as over 300 homes were destroyed that year. It resulted in a large increase in wildfire awareness and the need for better defensible space around homes and businesses in the area. In subsequent years the numbers have stabilized and decreased at times. 2008 to 2013 and 2016 were unavailable.

Table M-15 Chipping Stats 1999-2020

Season	Parcels Treated	Pounds or Cubic Yards Biomass Removed
2020	886	19,031 cubic yards
2019	760	6,001 cubic yards
2018	897	9,612 cubic yards
2017	674	3,791 cubic yards
2016	-	-
2015	437	152,000 pounds
2014	325	104,000 pounds
2008-2013	N/A	N/A
2007	1,323	807,500 pounds
2006	567	379,278 pounds
2005	634	353,450 pounds
2004	543	286,285 pounds
2003	636	285,100 pounds
2002	517	248,000 pounds
2001	716	427,840 pounds
2000	407	223,087 pounds
1999	546	299,277 pounds
Totals		
5,889 Lots = 1472.25 at ¼ acre per lot average.		

Source: North Tahoe FPD

M.7 Mitigation Strategy

M.7.1. Mitigation Goals and Objectives

The North Tahoe FPD adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

M.7.2. Mitigation Actions

The planning team for the North Tahoe FPD identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Avalanche
- Climate Change
- Drought & Water Shortage
- Earthquake
- Floods: Localized Stormwater
- Pandemic
- Seiche
- Severe Weather: Freeze and Snow
- Severe Weather: Heavy Rains and Storms
- Severe Weather: High Winds and Tornadoes
- Tree Mortality
- Wildfire

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

Action 1. Avalanche: Risk Reduction, Response Plan, and Pre-Incident Training

Hazards Addressed: Avalanche, Severe Weather: Freeze and Snow

Goals Addressed: 1, 2, 3, 4, 5, 7

Issue/Background: According to the Sierra Avalanche Center, avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Avalanches are a rapid down-slope movement of snow, ice and debris triggered by ground shaking, sound, or human or animal movement. Avalanches consist of a starting zone where the ice or snow breaks loose, a track which is the grade or channel the debris slides down and a run-out zone where the snow is deposited.

Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. The vast majority of avalanches occur during and shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. However, avalanches can lead to loss of life, damage to road and highway closures, and destroy structures and forests in their path of travel.

NTFPD has multiple potential avalanche hazard areas, and a history of past occurrences that have caused significant damage or resulted in the loss of life, property and environment.

Project Description: NTFPD to work directly with Placer County and other partner agencies to assist in the development of an Avalanche Risk Reduction and Response Plan and conduct Pre-Incident Training (sand table or mock avalanche) to ensure all responding agencies can efficiently and cohesively respond to avalanche events. NTFPD to conduct a review and update to their Avalanche Response Policy and a study to determine what apparatus and equipment purchases are needed to be well-equipped for response to this hazard.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Placer County Code 12.40 Avalanche Management Areas. NTFPD Lexipol Policy 319: Avalanche Response Policy.

Responsible Agency/ Department/Partners: Placer County / NTFPD/ Multi-Agency

Cost Estimate: Scalable, dependent on need to contract development of plan and purchase necessary equipment

Benefits (Losses Avoided): Life, Property, Environment

Potential Funding: Private, State, County, Local, Private

Timeline: 1 year to conduct Avalanche Risk Reduction and Response Plan. Ongoing pre-incident training exercises and purchase of necessary apparatus and equipment

Project Priority (H, M, L): H

Action 2. *Communications: Upgrades, Development, Maintenance, and Enhancement of Interoperability Radio Systems*

Hazards Addressed: Multi-Hazard (Emergency Response to Avalanche, Climate Change, Drought & Water Shortage, Earthquake, Floods: Localized Stormwater, Pandemic, Seiche, Severe Weather: Freeze and Snow, Severe Weather: Heavy Rains and Storms, Severe Weather: High Winds and Tornadoes, Tree Mortality, and Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: Communications is a critical factor in the operations and daily functions of North Tahoe Fire Protection District. Radio communications is the primary source of dispatch for all fire

department operations. The current radio system is a complex network of fixed and mobile infrastructure that allows for fire resources to effectively communicate with dispatch and other public safety agencies to mitigate emergency and non-emergency incidents.

The need for effective communications, consolidated dispatch, technology updates, and multi-jurisdictional interoperability are critical to firefighter and public safety as well as property and environmental conservation. FCC P-25 is an unfunded mandate of significant expense that affects the local taxpayer and fire district budgets for many years. Radio Equipment has a limited-service life, requires consistent maintenance and upgrades, and is an expensive expenditure for the district. The District also has dead zones and has identified the need for repeaters, and repeater replacements for complete coverage.

Project Description: NTFPD will plan and implement communications related upgrades, developments, replacements, maintenance, and enhancement of current systems in order to meet cross-jurisdictional interoperability needs.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: NTFPD and the Lake Tahoe Regional Fire Chiefs Association solicited a Department of Homeland Security CISA Bi-state Communications Center assessment reports (Tahoe Regional Command Center Study & Communications Infrastructure) and the Federal Communication Commission (FCC) Standards and Specifications. State of California, Office of Emergency Services Standards and Specifications. State of California, CAL FIRE Standards and Specifications.

Responsible Agency/ Department/Partners: NTFPD and Emergency Service Partners

Cost Estimate: \$500,000+ for base, mobile, portable, and fix geographical repeater radios and systems. \$200,000 annually for Grass Valley Emergency Command Center contract and NTFPD Upgrades/Replacements/Repair/Maintenance needs. Pending results of DHS CISA studies it is anticipated that a multi-million dollar project will be needed to bring comms systems up to regional standards.

Benefits (Losses Avoided): Life, Property and Environment. Technology and equipment upgrades, Interoperability with multi -disciplinary emergency response agencies, use of a regional, multi-agency collaborated dispatch center, local regional partnerships between state & local public safety agencies with cost sharing of maintenance and development of critical infrastructure.

Potential Funding: Federal, State, County, Local, Private

Timeline: New projects are prioritized and completed as funding becomes available. Older equipment is replaced with new equipment that meets FCC guidelines, Department of Homeland Security, SAFECOM, 6 Levels of Interoperability as well as CAL FIRE and CalOES comms standards. Maintenance of current infrastructure is part of Fire District's annual budget and is supported by local taxpayers.

Project Priority (H, M, L): H

Action 3. *Community Wildfire Prevention Plan Implementation: Forest Management, Fuels Reduction, Defensible Space, Home Hardening, Curbside Chipping, Greenwaste Disposal, Tree Marking, Fire Adapted and Firewise Communities, Outreach & Education*

Hazards Addressed: Multi-Hazard: Wildfire, Tree Mortality, Climate Change, Severe Weather: High Winds

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: Wildfire is inevitable in the Lake Tahoe Basin. In fact, many of the region's plant and animal species are dependent on the natural disturbance caused by wildfires. The disturbance creates opportunities for new growth, cycles nutrients through soils, and maintains biological diversity. Such species are fire-adapted and have developed strategies to survive and thrive in the presence of wildfire. Wildfires become disasters when they threaten lives, burn homes, destroy infrastructure, and damage watersheds. Developing and implementing strategies to make human communities more fire-adapted can prevent or lessen the impact of such disasters. The Community Wildfire Protection Plan provides strategies that can be implemented by fire agencies, land managers, policy makers, community leaders, residents, visitors, and others that will make Lake Tahoe Basin communities better prepared for the next inevitable wildfire, as well as respond to tree mortality, and adapt to climate change.

Following widespread wildland fires in the summer of 2002, President George W. Bush proposed the Healthy Forests Initiative, which was enacted into law by the Healthy Forests Restoration Act of 2003 (Public Law 108-408). The Act encouraged thinning dense forests on federal, state, local, and private land to help protect communities from intense wildfires, improving fire suppression capabilities, and increasing forests' resistance to destructive insects. Communities were also encouraged to create a Community Wildfire Protection Plan (CWPP) to collaboratively designate areas in the Wildland-Urban Interface that were the most in need of thinning.

Project Description: Implement the Lake Tahoe Multi-Jurisdictional Fuel Reduction & Wildfire Prevention Strategy, Lake Tahoe Basin Community Wildfire Protection Plan, and the Lake Tahoe Basin Forest Action Plan within communities that NTFPD serves.

Projects include but not limited to:

- Collaborate and plan projects and initiatives with all interested partners
- Prioritize Hazardous Fuel Reduction
- Restore & Maintain Fire-Resilient Landscapes
- Provide Effective & Efficient Wildfire Response
- Treat Structural Ignitability
- Defensible space inspections, education, assistance and enforcement
- Home Hardening and retrofit education and assistance
- Residential Chipping program, Greenwaste & Biomass utilization and disposal
- Tree Marking and Tree Removal Permits
- Create Fire Adapted Communities
- Coordinate Firewise USA recognition

- Encourage and provide effective and appropriate Forest Management and Fuels Reduction to act and adapt to a changing climate
- Implement the Tahoe PTEIR Program
- Provide robust public outreach and education
- Provide Community Assistance and Incentivization

Other Alternatives: Aggressive Fire Suppression which is not acceptable as a sole action to mitigate risk

Existing Planning Mechanism(s) through which Action Will Be Implemented:

- Lake Tahoe Multi-Jurisdictional Fuel Reduction & Wildfire Prevention Strategy
- Lake Tahoe Basin Community Wildfire Protection Plan
- Lake Tahoe Basin Forest Action Plan
- Tahoe Program Timberland Environmental Impact Report (Tahoe PTEIR)
- Lake Tahoe Climate Adaptation Action Portfolio
- Placer County Sustainability Plan
- California's Climate Change Scoping Plan
- California's Wildfire and Forest Resilience Action Plan
- CAL FIRE (NEU & AEU) Strategic Fire Plans

Responsible Agency/ Department/Partners: NTFPD/Partner Tahoe Fire and Fuels Team/Partners/Stakeholders/Community Members

Cost Estimate: \$1,000,000+ annually

Benefits (Losses Avoided): Life, Property and Environment

Potential Funding: Federal, State, County, Local, Private

Timeline: Ongoing

Project Priority (H, M, L): H

Action 4. GIS Technology, Equipment, Database and Mapping Improvements

Hazards Addressed: Multi-Hazard (Avalanche, Climate Change, Drought & Water Shortage, Earthquake, Floods: Localized Stormwater, Pandemic, Seiche, Severe Weather: Freeze and Snow, Severe Weather: Heavy Rains and Storms, Severe Weather: High Winds and Tornadoes, Tree Mortality, and Wildfire)

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: Handle and manipulate information, statistical analysis, project planning and tracking, fire prevention, fuels management, parcel treatment, services provided:

- GIS/GPS interface for response routes, hydrant flow data and physical locations when covered by snow.
- Critical tool for many applications used in fuels management, prevention and emergency services.
- Sharing information with other agencies for project work; and
- Presentations for public education, evacuation routes, fuels management.

Project Description: Identify personnel to receive in-depth ArcGIS training and purchase all necessary GIS licensing and equipment to support the District’s GIS capabilities and needs. Retain an annual GIS budget to train current staff or consider contracting out in-depth GIS data analysis, map creation and geographic data entry needs.

Other Alternatives: None identified

Existing Planning Mechanism(s) through which Action Will Be Implemented: Tahoe Basin Fire Commission Report, Recommendation #6. Identified inherent need to increase GIS capabilities

Responsible Agency/ Department/Partners: NTFPD

Cost Estimate: \$100,000 to train dedicated staff and purchase additional equipment

Benefits (Losses Avoided): Improve response times and availability of information on emergencies as well as improved regional information sharing

Potential Funding: Federal, State, County, Local, Private

Timeline: Ongoing

Project Priority (H, M, L): H

Action 5. *Pandemic Preparedness and Response Plan*

Hazards Addressed: Pandemic

Goals Addressed: 1, 2, 3, 4, 5, 7

Issue/Background: A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. Pandemics do not directly affect District facilities, but can affect District personnel who operate and manage District facilities and apparatus, including ambulances. During a pandemic the District would typically be considered essential, which puts staff on the front line and at immediate high-risk for exposure as they work to carry on the mission of the District and serve the community. Because there are no hospital facilities in the District, North Tahoe Fire must be adequately prepared not only to carry out their typical first responder duties, but also to transport patients who have become infected with the virus, while protecting other patients who have not been exposed or infected.

The 20th century saw three outbreaks of pandemic flu:

- The 1918-1919 Influenza Pandemic (H1N1)
- The February 1957-1958 Influenza Pandemic (H2N2)
- The 1968 Influenza Pandemic (H3N2)

To date, the 21st century has seen two acknowledged pandemics:

- 2009 Swine Flu (H1N1)
- 2019/2020/2021 COVID-19

As experienced during the COVID-19 pandemic and its multiple waves, closures and stay-at-home orders disrupted supply chains globally, and interrupted the delivery of basic services and essential supplies. A Pandemic Preparedness Response Plan is necessary for the District to be prepared for the next global pandemic, and its impacts to the services we provide. This includes priority access to PPE, Virus Testing and Vaccines, as well as a plan for reimbursement for the treatment and transport of viral patients, and a reimbursement of costs resulting from the response to the pandemic, including lost revenue.

Project Description: North Tahoe Fire has identified essential supplies, functions and services needed to sustain its mission and operations during a pandemic. In order to perform our mission, the District must have an adequate supply of PPE and disinfecting methodologies to protect staff, facilities and equipment in order to safely serve our community. The project reflects lessons learned from the response so far, and serves as a basis for continued preparedness and progress through and beyond the current pandemic.

A Pandemic Preparedness Response Plan includes an available cache of:

- Gloves
- Masks, Face Coverings, and N95s
- Face shields
- Booties
- Goggles
- Gowns
- PAPRs
- Disinfecting sprays/treatments
- Sterilizing equipment for ambulances, engines, equipment and facilities
- Material for vertical separations
- Virus Testing
- Vaccines

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: The District's "Response to Executive Order N-25-20" will serve as the planning mechanism for Pandemic Response, and to guide for Station and Personnel Directives, and Incident Directives.

Responsible Agency/ Department/Partners: North Tahoe Fire Protection District

Cost Estimate: \$200,000

Benefits (Losses Avoided): This project would specifically meet the tenets specified in the Public Assistance Program and Policy Guide - FP-104-009-2 / June 2020 by providing a plan for the District to fulfill its mission while preventing barriers to community lifelines that eliminate or lessen immediate threats to lives, public health, or safety in a cost-effective manner. The Plan helps foster better integration across the whole community since lifeline management transcends public and private sector boundaries.

Potential Funding: Federal, State, County, Local

Timeline: 5 years in conjunction with the LHMP

Project Priority (H, M, L): H

Action 6. Tahoe Emergency Notifications System (TENS)

Hazards Addressed: Multi-Hazard: Wildfire, Seiche, Avalanche, Earthquake, Severe Weather

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The region's natural attributes are the biggest driver of its \$5billion annual economy, which is based on outdoor recreation and tourism. Cellular data shows that nearly ten million vehicles travel here annually which results, in part, because of Lake Tahoe's central location in the Sierra Pacific Megapolitan Area, a corridor of growing metropolitan areas that extends from the San Francisco Bay Area to Reno. More than 14 million people live in this corridor, and many visitors drive to Lake Tahoe to enjoy its world-class recreation opportunities. Visitation can exceed 24 million annually with the peak visitation in summer when fire danger is high, and in winter when snow is at its heaviest. Peak visitor traffic causes significant congestion in community centers, at recreation areas, and at the six regional entry and exit points, which affects emergency response times.

With a large, centralized lake that crosses two states and five counties, a rugged mountainous landscape, and severe weather conditions, the area is susceptible to fire, avalanche, mudslide, and flooding, and climate change will only exacerbate these issues. High visitation rates in the area and an increase in vacation rentals result in a significant number of people present in the Basin who are unfamiliar with the regional evacuation protocols, limited egress routes, or where to access information.

The District has programmable mobile sign trailers, however public messaging is a challenge when visitors are not signed up to receive emergency alerts from any of the five counties they may visit during their stay.

Project Description: North Tahoe Fire Protection District, in partnership with the Tahoe Transportation District, will work with regional partners to build an interoperability situational awareness platform and associated public warning system that can support and integrate with regional dispatch systems, Nevada Dept. of Transportation (NDOT), Caltrans ITS systems, and the AlertTahoe System (<http://www.alertwildfire.org/tahoe/>). NDOT, Highway Patrol, and the Regional Transportation Commission (RTC) of Southern Nevada are implementing a "Software as a Service" platform that was integrated with the RTC's ITS system, and Nevada is expanding the system statewide. Southern Nevada's initial findings have shown an improvement of 10 to 15 minutes in incident response time in just a few months' time. They are integrating fire incidents into the system and are expecting similar improved performance in fire response times. The system uses real-time data to provide automated incident identification through a multitude of sources, such as inductive loop traffic detectors, microwave vehicle detectors, on-board devices (OBD II), navigation apps, telematics, weather data, special events (Ticketmaster), dynamic warning signs, construction and road closure information, road camera feeds, traffic crashes and incidents (through crowd sourcing, such as Waze and the 911 systems), and public transit information. The demonstration system is now moving towards more predictive insights and early warnings for proactive crash prevention and dynamic traffic flow optimization.

The Utility and Infrastructure project, Tahoe Evacuation Notification System (TENS), will provide a cross-jurisdictional system that emergency managers will use to improve performance, while providing predictive insights and more connectivity between

first responders, traffic and transit operations, and the public. The system will integrate publicly available datasets to provide a better understanding of visitors in the Lake Tahoe Basin, including travel movements and duration of stay, emergency roadway issues

including closures or hazards caused by landslides, fires, toxic spills, avalanches, tree falls, downed power lines and power outages. These criteria will be considered for real-time detection and notification systems and reduction in secondary incidents.

As wildland fire is the biggest risk in the Tahoe Basin, further benefits will include early notification of wildland fire through the Alert Tahoe Camera system that will allow fires to be pinpointed and relayed back into the end warning system. Additionally, the application will provide location information to direct the public to defibrillators placed throughout public areas within the Basin. Smart streetlights will be utilized for housing a variety of warning systems and to provide input to public agencies for overall situational awareness that can influence disaster management and evacuations. Public notifications and overall public agency situational awareness input would include audio speakers, siren warning systems, dynamic message boards, outdoor acoustic sensors, weather sensors, camera systems, and lights to influence directional traffic flows in the event of evacuations. Although the intent of these devices is not to provide communications, they are built to communicate these disaster warnings and notifications back to the public, including a multi-lingual fashion if required by the demographic aspect of the communities.

Other Alternatives: No action alternative or business as usual

Existing Planning Mechanism(s) through which Action Will Be Implemented: Intelligent Transportation System (ITS) upgrades and traffic management are identified as priority projects in the Tahoe Regional Planning Agency 2020 Regional Transportation Plan. The Tahoe Transportation District utilizes Article IX of the Bistate Planning Compact and the adopted Regional Transportation Plan as its planning mechanism.

Responsible Agency/ Department/Partners:

- North Tahoe Fire Protection District
- Tahoe Transportation District
- Tahoe Regional Planning Agency

Cost Estimate: \$8,000,000.00

Benefits (Losses Avoided): This project would: 1) specifically meet the tenets specified in the Public Assistance Program and Policy Guide - FP-104-009-2 / June 2020 by providing community lifelines that; 2) eliminate or lessen immediate threats to lives, public health, or safety; and 3) eliminate or lessen immediate threats of significant additional damage to improved public or private property in a cost-effective manner that fosters better integration and communication across the whole community since lifeline management transcends public and private sector boundaries.

Potential Funding: Federal, State, County, Local, Private

Timeline: 3-5 years implementation, with ongoing support and maintenance.

Project Priority (H, M, L): H

Action 7. *Water for Fire Suppression Collaborative*

Hazards Addressed: Multi-Hazard: Wildfire, Severe Weather: Snow, Drought & Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: NTFPD has identified the need to advise and assist with water system infrastructure improvements in order to increase the availability of water to support fire suppression operations year-round. The District is at risk to wildland fire during fire season, and severe winter storms and snowpack creates a unique challenge to locate and access fire hydrants during winter months when needed for structure fires. Climate change has also led to decreased snowpack and multi-year droughts that exacerbate wildfire risk and can lead to water shortages. There are over 1055 fire hydrants in the District serviced by 16 different water purveyors, with only 4 of those being public. Many of these small water purveyors have little to no funds available for infrastructure testing, inspecting, repairs and upgrades. Several of these systems were installed 50-100 years ago and were designed to only provide domestic water for season customers. NTFPD is faced with inadequate water supply, delivery, storage, and locations of fire hydrants. These infrastructural inadequacies have always existed within the District and have remained a top concern during the last two fire code adoption cycles. Adequate fire suppression infrastructure is a key component of community fire suppression capabilities. Allowing these inadequacies to exist without taking proactive steps to test, inspect and notify our various water purveyors has led to loss of property, threat to surrounding properties, damage to fire equipment, transmission into the wildland, and water-related inadequacies per The Fire Code for residential and commercial projects. The lack of adequate fire flow has a direct relation to life safety, environmental protection, property loss prevention and economic stability.

Project Description: North Tahoe and Meeks Bay Fire Protection Districts (NTFPD) will facilitate development of a collaborative "Water for Fire Suppression" partnership to inspect, test, paint, document data in GIS layer, and provide notifications in order to mitigate varying concerns and inadequacies with water delivery and storage on the California side of the Lake Tahoe Basin within District boundaries. This collaborative will allow NTFPD to interface with 16 water purveyors across 1055 fire hydrants in order to best serve 17,000 structures during fire season and winter weather alike.

Other Alternatives: No action alternative, Educate Water Purveyors. Neither will reasonably mitigate these hazards in the near-term

Existing Planning Mechanism(s) through which Action Will Be Implemented: The District is currently developing a Community Risk Assessment and Community Risk Reduction plan that would include water-related inadequacies as a risk and directly link to risk reduction mitigation actions. Lake Tahoe Community Fire Prevention Partnership (bi-state collaboration to improve water distribution systems and regional interconnectivity to be prepared to respond to wildfire)

Responsible Agency/ Department/Partners: NTFPD and 16 Water Purveyors

Cost Estimate: \$750,000 for initial 3 to 5 year project to hire a District water supply officer, purchase equipment necessary for testing and winter snow removal, conduct inspections, painting and installation of snow markers of all hydrants. data entry, GIS updates, and noticing. Project is scalable into the multi-million dollars to include critical infrastructure vegetation management, hydrant risers, water infrastructure replacements, upgrades and enhancements, and purchase of a fire boat as a floating hydrant to enhance fire suppression capabilities.

Benefits (Losses Avoided): Loss of Life, Property and Environment. The number one threat to Lake Tahoe Basin is wildland fire. Lake Tahoe's Angora Fire in 2007 burned 3,071 acres, destroyed 254 homes, and incurred and estimated \$150,000,000 in property loss and \$12,000,000 in suppression costs. Couple the threat of catastrophic wildfire with an increasingly drier climate and forecasted climate change impacts, increasing the availability of water for fire suppression has a direct relation to life safety, environmental protection, property loss prevention and regional economic stability.

Potential Funding: Federal, State, County, Local, Private

Timeline: 3-5 years. This project will remain ongoing as annual hydrant testing, exercising and snow removal is priority and necessity

Project Priority (H, M, L): H